

PB-247 207

AIR POLLUTION ABSTRACTS. VOLUME 5, NUMBER 8
37615-38846

Air Pollution Technical Information Center
Research Triangle Park, North Carolina

August 1975

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PB 247 207

Volume 5, No. 8
August 1974
APABCA-5(8)(1974)
US ISSN 0027-5956

AIR POLLUTION ABSTRACTS

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AUGUST 1974

U.S. ENVIRONMENTAL PROTECTION AGENCY
Assistant Administrator for Air and Water Programs
Office of Air Quality Planning and Standards
Control Programs Development Division
Research Triangle Park, N. C. 27711

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TECHNICAL REPORT DATA (Please read Instructions on the reverse before completing)		
1. REPORT NO. APABCA-5-8-1974	2.	3. REPORT ACCESSION NO. PB247207
4. TITLE AND SUBTITLE Air Pollution Abstracts Volume 5, No. 8	5. REPORT DATE August 1974	
7. AUTHOR(S)	6. PERFORMING ORGANIZATION CODE	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Air Pollution Technical Information Center Research Triangle Park, North Carolina 27711	8. PERFORMING ORGANIZATION REPORT NO.	
12. SPONSORING AGENCY NAME AND ADDRESS Same	10. PROGRAM ELEMENT NO.	
	11. CONTRACT/GRANT NO.	
	13. TYPE OF REPORT AND PERIOD COVERED	
	14. SPONSORING AGENCY CODE	
15. SUPPLEMENTARY NOTES		
16. ABSTRACT This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 37615 - 38846.		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air pollution Abstracts Information retrieval		13B 5B
		PRICES SUBJECT TO CHANGE
19. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS (This Report)	21. NO. OF PAGES 263
	20. SECURITY CLASS (This page)	22. PRICE \$900-2.25

AIR POLLUTION ABSTRACTS

VOLUME 5, NO. 8

AUGUST 1974

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

Subscribers receiving 'Air Pollution Abstracts'
directly from the U. S. Government Printing Office
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U. S. Government Printing Office, Washington, D., C. 20402

The Administrator of the Environmental Protection Agency has determined that the publication of this periodical is necessary in the transaction of public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through March 31, 1975.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
Price \$2.25 (single copy) and \$3.00 for each index issue. Subscription price: \$27 per year; \$6.75 additional for foreign mailing.

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Author Index.....	AI-1
Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.	

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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The serial publications (journals, periodicals, etc.) being scanned number approximately 7,000. A list of approximately 1,000 of the most productive publications with the address of each publisher is available upon request.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching --more than those included in the subject index in each issue.

Acknowledgement is given to the Technical Publications Branch, Informational Services Division, Office of Administration, Research Triangle Park, N.C. for the make-up of the cover and for arrangement of printing and distribution.

Feedback from our users, including suggestions of articles, are always welcome.

APTIC Publications

- Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts*, June 1973, GPO No. EP 4.9:126, \$0.65.
- Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts*, June 1973 GPO No. EP 4.9:125, \$0.70.
- Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts*, March 1973, GPO No. EP 4.9:121, \$2.35.
- Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts*, June 1973, GPO No. EP 4.9:119, \$0.90.
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- Odors and Air Pollution: A Bibliography with Abstracts*. October 1972, GPO No. EP 4.9:113, \$3.00.
- Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts*, July 1972, GPO No. EP 4.9:110, \$1.25.
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- Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:96, \$2.25.
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- Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:93, \$0.45.
- Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:92, \$1.00.
- Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes)*, March 1971, GPO No. EP 4.9:88, \$6.25.
- Beryllium and Air Pollution: An Annotated Bibliography*, February 1971, GPO No. EP 4.9:83, \$0.40.
- Asbestos and Air Pollution: An Annotated Bibliography*, February 1971, GPO No. EP 4.9:82, \$0.50.
- Municipal Incineration: A Review of Literature*, June 1971, GPO No. EP 4.9:79, \$1.00.
- Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes)*, October 1970, GPO No. HE 20.1309:75, \$5.00.

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ASSISTANCE TO REGION IV STATES IN OBTAINING, REVIEWING, AND UPDATING DATA FOR AQMA PLAN DEVELOPMENT.
PEDCo Environmental Specialists, Inc., Suite 13, Atkinson Square, Cincinnati, Ohio 45246
- Contract No. 68-02-1380, Task Order No. 7 \$60,000
ASSISTANCE TO REGION IV STATES IN OBTAINING, REVIEWING, AND UPDATING DATA FOR AQMA PLAN DEVELOPMENT.
Engineering Science, Inc., 7903 West Park Drive, McLean, Virginia 22101
- Contract No. 68-02-1299, RFP No. Du-74-B380 \$109,875
COMPARE PULMONARY CARCINOGENESIS OF PLATINUM GROUP METAL COMPOUNDS AND LEAD COMPOUNDS IN ASSOCIATION WITH POLYNUCLEAR AROMATICS USING IN VIVO HAMSTER SYSTEM.
The Research Foundation of State University of New York, S.U.N.Y. - Stony Brook, P. O. Box 7126, Albany, New York 12224
- Contract No. 68-02-1436, RFP No. Du-73-A199 \$115,334
LABORATORY DATA PROCESSING SYSTEM.
Aerotherm Division, Acurex Corporation, 485 Clyde Avenue, Mountain View, California 94042
- Contract No. 68-02-1713, RFP No. Du-74-B437 \$117,975
THE EFFECT OF NO2 EXPOSURE ON THE DISPOSITION, DEGRADATION AND METABOLISM OF CERTAIN ENDOGENOUS ANTIOXIDANTS OF THE MAMMALIAN SYSTEM.
Stanford Research Institute, Menlo Park, California 94025
- Contract No. 68-02-1286, RFP No. Du-74-B404 \$174,662
A COMPARATIVE STUDY OF THE EFFECTS OF INHALATION OF Pt., Pb., AND OTHER BASE METAL COMPOUNDS UTILIZING THE PULMONARY MACROPHAGE AS AN INDICATOR OF TOXICITY.
University of Cincinnati, College of Medicine, Kettering Laboratory, Eden & Bethesda Avenues, Cincinnati, Ohio 45219
- Contract No. 68-02-1375, Task Order No. 11 \$92,000
COMPLIANCE SCHEDULE DEVELOPMENT/ENFORCEMENT ACTION ASSISTANCE TO REGION V FOR SOURCES IN THE STATES OF ILLINOIS AND OHIO.
PEDCo Environmental Specialists, Inc., Suite 13, Atkinson Square, Cincinnati, Ohio 45246

Contract No. 68-02-1722, RFP No. Du-74-B402 \$56,938
 DETERMINATION OF THE MAGNITUDE OF SO₂, NO, CO₂, AND O₂ STRATIFICATION IN THE DUCTING OF FOSSIL-FUEL-FIRED POWER PLANTS.
 Esso Research & Engineering Company, P. O. Box 172, Linden, New Jersey 07036

Contract No. 68-02-1442, RFP No. Du-74-A165 \$61,435
 TECHNICAL ANALYSIS AND REPORTS PREPARATION IN THE AREA OF AIR POLLUTION METEOROLOGY AND MODELING.
 Geomet, Inc., 50 Monroe Street, Rockville, Maryland 20850 (NOTE: Contract contains option in the amount of \$61,435)

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 DETERMINE REQUIREMENTS FOR OBTAINING BASELINE LEVELS OF PLATINUM AND PALLADIUM IN HUMAN TISSUE.
 Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas 78284

Contract No. 68-02-1703, RFP No. Du-74-B503 \$44,645
 DEVELOPMENT OF A SENSITIVE AND SPECIFIC GLC-DETECTOR FOR HALOGEN NITROGEN AND SULFUR CONTAINING PESTICIDES.
 Purdue University, Purdue Research Foundation, West Lafayette, Indiana 47907

Contract No. 68-02-1234, Modification No. 3 \$42,782
 DEVELOPMENT OF GUIDELINES AND QUALITY ASSURANCE PROGRAMS FOR DETECTION OF LEAD AND PHOSPHOROUS IN UNLEADED GASOLINE (METHODS A, B AND C) AND FOR VISIBLE EMISSIONS, CO, H₂S (METHODS 9,10 and 11).
 Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-0629, Modification No. 4 \$96,600
 CONTINUATION OF DEVELOPMENT OF CONTROL OF POLLUTANTS IN FOSSIL FUEL CONVERSION/TREATMENT PROCESS.
 Esso Research & Engineering Company, P. O. Box 8, Linden, New Jersey 07036

Contract No. 68-02-1706, RFP No. Du-74-B502 \$80,000
 EXTENSION OF MULTI-RESIDUE METHODOLOGY.
 University of Florida, Gainesville, Florida 32611

Contract No. 68-02-1387, Task Order No. 3 \$291,000
 PARTICULATE STUDY FOR THE SOUTHWEST PENNSYLVANIA INTRASTATE AIR QUALITY CONTROL REGION.
 H. E. Cramer Company, Inc., P. O. Box 9249, Salt Lake City, Utah 84109

Contract No. 68-02-1705, RFP No. Du-74-B501 \$182,536
 IDENTIFICATION OF TOXIC IMPURITIES IN TECHNICAL MIXTURES OF PESTICIDES DESIGNATED AS SUBSTITUTE CHEMICALS FOR CURRENTLY REGISTERED PESTICIDES.
 Battelle Memorial Institute, Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201

Contract No. 68-02-1714, RFP No. Du-74-B463 \$111,400
 CHEMISTRY OF NITROGEN COMPOUNDS IN AIR.
 Battelle Memorial Institute, Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201

Contract No. 68-02-1720, RFP No. Du-74-B475 \$98,850
 SMOG CHAMBER STUDY OF RATE OF CONVERSION OF SO₂ AS FUNCTION
 OF REACTANT CONCENTRATION.
 Battelle Memorial Institute, Columbus Laboratories, 505 King Avenue, Columbus, Ohio
 43201 (NOTE: Contract contains options in the amount of \$148,750)

Contract No. 68-02-1728, RFP No. Du-74-B466 \$44,760
 RELIABILITY OF METHODS FOR MEASUREMENT OF SULFATE IN AMBIENT AIR.
 Midwest Research Institute, 425 Volker Blvd., Kansas City, Missouri 64110

Contract No. 68-02-1715, RFP No. Du-74-B500 \$249,454
 TOXICOLOGICAL EVALUATION OF MATERIALS FOUND AS IMPURITIES IN
 TECHNICAL PREPARATION OF PESTICIDES AND OF MATERIALS
 DESIGNATED AS SUBSTITUTE CHEMICALS FOR CURRENTLY REGISTERED
 PESTICIDES.
 Battelle Memorial Institute, Columbus Laboratories, 505 King Avenue, Columbus, Ohio
 43201

Contract No. 68-02-1737, RFP No. Du-74-B546 \$94,873
 PURCHASE, OPERATE, MAINTAIN, AND CALIBRATE CHESS STATIONS IN CHAT-
 TANOOGA, TENNESSEE.
 Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1341, Modification No. 4 \$51,370
 DESIGN, FABRICATE AND DELIVER ONE BETA SENSING IMPACTOR, WITH OP-
 TION TO PURCHASE ONE ADDITIONAL INSTRUMENT.
 GCA Technology Division, GCA Corporation, Burlington Road, Bedford, Massachusetts
 01730

Contract No. 68-02-1382, Task Order No. 3 \$45,000
 IMPACT OF STANDARDS OF PERFORMANCE ON 1985 EMISSIONS - PHASE II.
 TRC, The Research Corporation of New England, 125 Silas Deane Highway, Wethersfield,
 Connecticut 06109

Contract No. 68-02-1386, Task Order No. 8 \$43,500
 QUALITY ASSURANCE PROGRAM FOR URBAN AND NON-URBAN OZONE STU-
 DY.
 Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1736, RFP No. Du-74-B479 \$53,280
 DEVELOPMENT OF PARTICULATE SAMPLING TRAIN FOR DETERMINING THREE
 SIZE FRACTIONS IN PARTICULATE EMISSIONS FROM POWER PLANTS.
 Southern Research Institute, 2000 9th Avenue South, Birmingham, Alabama 35205

Contract No. 68-02-0696, Modification No. 2 \$33,560
 SCREENING, CATALOGING AND ABSTRACTING OF BIOMEDICAL JAPANESE AIR
 POLLUTION LITERATURE, PUBLISHED AND UNPUBLISHED IN JAPAN.
 The Franklin Institute, Twentieth and Benjamin Franklin Parkway, Philadelphia, Pennsylvania
 19103

Contract No. 68-02-1731, RFP No. Du-74-B442 \$36,000
 FEASIBILITY STUDY FOR EVALUATION OF ANALYTICAL METHODOLOGY FOR
 ASSESSMENT OF THE EXPOSURE OF INDIVIDUALS TO AIR POLLUTANTS:
 POLLUTANT DOSIMETRY.
 Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1288, RFP No. Du-74-B389 \$34,340
 ALTERATIONS, RENOVATIONS, OPERATION AND MAINTENANCE OF THE
 PHILADELPHIA CONTINUOUS AIR MONITORING STATION.
 City of Philadelphia, Department of Public Health, 540 Municipal Service Building, Philadel-
 phia, Pennsylvania 19102

Contract No. 68-02-1725, RFP No. Du-74-B460 \$48,000
 STUDY TO DETERMINE THE DISTRIBUTION OF CADMIUM IN HUMAN TISSUE.
 Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas 78284 (NOTE: Con-
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 STUDY OF THE IMPACT OF THE REACTIVITY CRITERIA ON CONTROL STRATE-
 GIES FOR ORGANIC EMISSIONS IN SOUTHERN CALIFORNIA AIR BASIN.
 TRW, Inc., Transportation & Environmental Operations, One Space Park, Redondo Beach,
 California 90278

Contract No. 68-02-0768, Modification No. 10..... \$202,389
 STATIONARY AND MOBILE FACILITIES FOR STUDY OF HEALTH EFFECTS OF
 ENVIRONMENTAL CONTAMINANTS.
 Computer Sciences Corporation, 6565 Arlington Boulevard, Falls Church, Virginia 22046

Contract No. 68-02-1743, RFP No. Du-74-B452 \$152,549
 INVESTIGATE SAMPLING INTERFACE PARAMETERS FOR SELECTED
 SOURCE/MONITOR COMBINATIONS FOR SO₂ AND H₂S.
 Beckman Instruments, Inc., 1630 South State College Boulevard, Anaheim, California 92806

Contract No. 68-02-1098, Modification No. 1..... \$95,972
 STANDARDIZATION OF STATIONARY SOURCE EMISSION METHODS.
 Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri 64110

Contract No. 68-02-1724, RFP No. Du-74-B447 \$238,615
 HUMAN BIOCHEMICAL AND PHYSIOLOGIC RESPONSE TO ACUTE PHOTOCHEMI-
 CAL AIR POLLUTION EXPOSURE.
 Copley International Corporation, 7817 Herschel Avenue, P. O. Box 1530, La Jolla, Califor-
 nia 92037

Contract No. 68-02-1726, RFP No. Du-74-B532 \$74,782
 COMPARATIVE EFFECTS OF RESPONSIBLE PARTICLES, GASES, AND MISTS ON
 RESPIRATORY FUNCTION AND PARTICLE DISPOSITION AND CLEARANCE IN
 DONKEYS AS THE MODEL FOR PULMONARY IRRITATION.
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 Environmental Research Corporation, 3725 Dunlap Street, St. Paul, Minnesota 55112

Contract No. 68-02-1382, Task Order No. 6 \$45,000
 INSTALLATION OF THE ENFORCEMENT MANAGEMENT SYSTEM FOR THE
 METROPOLITAN BOSTON AIR QUALITY CONTROL REGION.
 The Research Corporation of New England, 125 Silas Deane Highway, Wethersfield, Connec-
 ticut 06109

Contract No. 68-02-1478, RFP No. Du-74-A103..... \$62,426
EMISSION, AIR QUALITY AND MONITORING TRENDS AND GUIDELINE REPORT
PREPARATION.
 GCA Technology Division, GCA Corporation, Burlington Road, Bedford, Massachusetts
 01730

Contract No. 68-02-0273, Modification No. 8..... \$74,985
PARTICLE SIZING TECHNIQUES FOR CONTROL DEVICE EVALUATION.
 Southern Research Institute, 2000 Ninth Avenue, Birmingham, Alabama 35205

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OPTIMUM SITE EXPOSURE CRITERIA FOR CO MONITORING.
 Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025

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DEVELOPMENT OF A HAZARDOUS AND TRACE SUBSTANCE INVENTORY
SYSTEM (HATREMS).
 GCA Corporation, GCA Technology Division, Bedford, Massachusetts 01730

Contract No. 68-02-1477, RFP No. Du-74-A100..... \$131,316
EVALUATION OF THE CONTROLLABILITY OF POWER PLANTS TO MEET EMIS-
SION AND AIR QUALITY STANDARDS AND THE CONVERTIBILITY OF GAS
AND OIL-FIRED PLANTS TO COAL.
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FIELD COMPARISON OF PROTOTYPE LASER-INDUCED FLUORESCENCE NO2
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 The Aerospace Corporation, P. O. Box 92957, Los Angeles, California 90009 Inp 522,522

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DEVELOPMENT OF STANDARDS FOR THE CALIBRATION OF X-RAY SPEC-
TROMETERS FOR ANALYSIS OF POLLUTION SAMPLES.
 Columbia Scientific Industries, P. O. Box 6190, Austin, Texas 78762

Contract No. 68-02-1739, RFP No. Du-74-B449..... \$29,500
DEVELOPMENT OF STANDARDS FOR THE CALIBRATION OF X-RAY SPEC-
TROMETERS FOR ANALYSIS OF POLLUTION SAMPLES.
 Columbia Scientific Industries, P. O. Box 6190, Austin, Texas 78762

Contract No. 68-02-1742, RFP No. Du-74-B514..... \$49,600
AIR QUALITY MODELING STANDARDS PERFORMANCE.
 General Research Corporation, 5383 Hollister Avenue, Santa Barbara, California 93105

Contract No. 68-02-1730, RFP No. Du-74-B429..... \$110,215
CHROMOSOMAL ABERRATIONS IN PERIPHERAL LYMPHOCYTES OF MAN AS A
FUNCTION OF EXPOSURE TO ENVIRONMENTAL OZONE.
 University of Utah Research Institute, Utah Biomedical Test Laboratory, 520 Wakara Way,
 Salt Lake City, Utah 84108

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS—HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

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APTIC NO. 61349

Azvedo, J., R. G. Flocchini, T. A. Cahill, and P. R. Stout
ELEMENTAL COMPOSITION OF PARTICULATES
NEAR A BEEF CATTLE FEEDLOT. *J. Environ. Quality*, 3(2):171-174, April-June 1974. 1 ref.

The elemental compositions of dusts captured near a beef cattle feedlot were examined to determine whether manure dusts could be identified in the presence of background dusts using alpha excited x-ray fluorescence. Large quantities of particulates greater than 17 micron in diameter were caught within the feedlot, but concentrations of these large particulates downwind of the lot were equal to or less than upwind levels. High ratios of phosphorus sulfur, chlorine, potassium, and calcium to silicon distinguished feedlot dusts to greater than 2 micron background particulates. For small particulate sizes (less than 2 micron) feedlot dusts were characterized by relatively high Cl, K, and Ca to Si ratios. On the fringe of feedlot influence, about 100 m downwind, high K/Si and Ca/Si ratios were the most reliable indicators of manure dust. For the particular environmental conditions in the southern San Joaquin Valley of California, feedlot dusts were not detected at a distance of 750 m downwind. Feedlot dust consists mainly of large particulates that drop out rapidly and locally. (Author abstract)

37616

APTIC NO. 61108

Broer, W. T.

MEASUREMENT PROGRAM FOR NITROGEN OXIDES
EMISSIONS. (Meetprogramma uitwerp van stikstofox-
yden). Text in Dutch. *Gas*, 94(3):97-101, March 1974.

The total nitrogen oxide, nitrogen dioxide, hydrocarbon, carbon dioxide, carbon monoxide, and oxygen concentrations in Groningen natural gas-fired, large-capacity combustion equipment flue gases were measured by sampling in the flue gas duct. The corrected total nitrogen oxide, NO₂, hydrocarbon, CO₂, CO, and O₂ concentrations in power plant boiler flue gases were in the respective ranges of 88-560 ppm, 3-16 ppm, 0-1 ppm, 9.4-11.4% by volume, 0-300 ppm, and 0.5-4.1% by volume. The corresponding concentrations in industrial water-tube boiler flue gases were 72-216 ppm, 3-23 ppm, 0-8 ppm, 8.3-11% by volume, 0-1500 ppm, and 1.3-6.1% by volume. Gas turbine-generated flue gases contained 4-89 ppm total nitrogen oxides, 3-44 ppm NO₂, 2-142 ppm hydrocarbons, 1.2-2.8% CO₂ by volume, 0-190 ppm CO, and 16-18.8 ppm O₂. Increases in the nitrogen oxides concentrations with increasing boiler load was observed.

37617

APTIC NO. 61459

Dibelius, G. and O. Schwarz

KEYPOINTS IN THE DEVELOPMENT OF THERMAL
POWER PLANTS. (Schwerpunkte in der Entwicklung
thermischer Kraftwerke). Text in German. *VGB Kraft-
werkstechnik*, 54(3):194-202, March 1974. 14 refs.

Since the earth's reserves of coal are by far the largest of all fuels and guarantee a supply well into the year 4300 while mineral oil reserves will be exhausted around 2020 and those

of natural gas even sooner, a better coordination of the demands for protection against air pollution by power plants and the demands for energy supply is required. In the Federal Republic of Germany power plants of the future will have to be located in the coal mining centers of the Ruhr, Aachen, and the Saar, areas which are already considerably air polluted, particularly by dust and SO₂. According to the present draft of a technical directive for maintenance of clean air no new power plants could be erected in such areas until the general pollution has been brought down. This same draft also demands a reduction of dust emissions by old plants to the values of new plants which means in practice the closing of 9000 MW power plant capacity. A limitation of the sulfur content of coal to 1% by weight is practicable seems to be a satisfactory temporary solution to sulfur emissions. At the same time coal gasification should be promoted so that old plants could be as soon as possible switched to the use of desulfurized gas. If in addition some of the oil and natural gas operated plants can be switched to coal gas not only the power supply program of the government can be revealed but also the discrepancy to the technical directives eliminated. For the more distant future the promotion of the manufacture of synthetic natural gas seems desirable. Also, development of air condensation can be completed in the more distant future. In the long run development of nuclear fusion and of hydrogen technology is planned.

37618

APTIC NO. 61295

Gassmann, M.

FREON 14 IN PUREST KRYPTON AND IN THE AT-
MOSPHERE. (Freon 14 im Krypton reinst und in der At-
mosphäre). Text in German. *Naturwissenschaften* (Berlin),
61(3):127, 1974. 2 refs.

Purest krypton sold in the Federal Republic of Germany was found to contain CF₄ (freon 14) which is a very stable compound with the properties of noble gases to temperatures beyond 2000 C. In samples of various ages the CF₄ concentration fluctuates between 20 and several 100 ppm. The origin of this compound in krypton is unknown. A negligent pollution of purest krypton by the manufacturer can be ruled out with certainty. Industrial production of freon 14 is low, less than 10 tons per year. This leads to the conclusion that CF₄ is either a component or pollutant of atmospheric air. Industrial production of freon 14 is not enough to explain the relatively high concentration of 0.1 to 1 ppb in the atmosphere. However, CF₄ may be the end product of atmospheric conversion reactions of freons which are widely used as cooling agents or propellants. Other sources of emissions could be the combustion of teflon (with trash) and of fossil fuels. However, atmospheric CF₄ could also stem from volcanic eruptions.

37619

APTIC NO. 60392

Hemphill, Delbert D., Carl J. Marienfeld, Ravula S. Reddy,
and James O. Pierce

ROADSIDE LEAD CONTAMINATION IN THE MISSOU-
RI LEAD BELT. *Arch. Environ. Health*, vol. 28:190-194,
April 1974. 8 refs.

The lead content of soils and vegetation along highways used for truck transport of lead concentrate (essentially lead sulfide) from mines and mills to smelters was compared with that of control routes with comparable amounts of traffic but no

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ore transport. Greatly elevated levels of lead were present in the soils and vegetation along rights-of-way of ore truck routes, with contamination being limited for the most part to 100 years or less. The dispersal of lead sulfide dust could be largely prevented by the use of tight covers on the ore vats of the transport trucks. (Author abstract modified)

37620

Hishida, Kazuo

APTIC NO. 60421

TREATMENT TECHNIQUES FOR AIR POLLUTION-RELATED HARMFUL SUBSTANCES. (Taiki osen kankei yugai busshitsu shori gijutsu). Text in Japanese. PPM (Japan), 5(5):68-93, May 1974.

Chemical and physical information on the formation of pollutants, control methods, and maintenance and inspection of control equipment are reviewed. Cadmium and its compounds, chlorine and hydrogen chloride, fluoride and hydrogen fluoride, and lead and its compounds are described. Various industries and processes creating these substances are: Cd refining, Cd paint drying processes; various soda industries; manufacturing of chlorine, polyvinyl chloride, ferrous chloride, activated carbon, bleach, and chloroform; aluminum refining electric furnaces; and manufacturing of glass, phosphoric acid, calcium superphosphate, phosphate fertilizers, hydrogen fluoride, frosted glass and opaque glass; refining of lead, copper, and zinc; secondary refining of lead; manufacturing of lead paint, glass, nitrogen oxides; ammonia oxidation, and combustion. The forms, properties, toxicity of these substances, and the symptoms of health damages are described.

37621

Hohl, R.

APTIC NO. 61212

EFFECTS OF POWER GENERATION ON THE ENVIRONMENT, VIEW OF THE TOTAL ENERGY CONCEPT. (Einwirkungen der Energieerzeugung auf die Umwelt, Betrachtungen zur Gesamtenergiekonzeption). Text in German. Schweiz. Beuztg., 92(17):403-409, April 1974.

After a statistical account on the total energy consumption in Switzerland, the effects of power production on the environment are discussed. The effects include thermal pollution (local and world wide), oxygen consumption, enrichment of the atmosphere with carbon dioxide, climatic changes, air pollution by emission of toxic gases and dusts, radioactive radiation, noise, ruining the beauty of the environment, and interfering with the ecology of the water bodies. An evaluation of the most important energy producing methods with regard to the pollution they cause shows that there is no ideal method but that hydraulic power and nuclear power are considerably less polluting than fossil fuels. For fossil fuel-heated domestic heaters, the emission index measuring the effect of the toxic taste gases on the environment is about five times larger than for a large fuel-fired plant where qualified personnel supervises the combustion and flue gas cleaning facilities operate. For an improvement of the present situation, the existing domestic heating system should be replaced by remote heating and heat pumps which are entirely without emissions. If used in large numbers, they cool the water bodies which could then again be used for cooling in large nuclear power plants.

37622

Humphreys, J. F.

APTIC NO. 61483

AIR POLLUTION FROM POWER STATIONS. S. African Mech. Engr. (Johannesburg), 24(2):39-43, Feb. 1974. 12 refs.

The major considerations and equations involved in predicting ground level conditions from known chimney stack emissions for power stations are discussed. The general problem is similar for all industries that employ tall stacks and hot effluent gases. Using typical examples of ESCOM pulverized fuel power stations it is demonstrated that the sulfur dioxide

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levels are well below those associated with any health hazard and that dust nuisance is a possibility only at the older stations, the large new stations being entirely satisfactory. The problem demands continuous attention because of general industrial growth and the likelihood of more stringent standards in the future. (Author summary modified)

37623

Ishikura, Kanji

APTIC NO. 61604

THE STATE OF POLLUTION AND THE METHOD OF REGULATION IN THE MIZUSHIMA INDUSTRIAL AREA. (Osen no genjo to Mizushima kisei hoshiki no jitai). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(5):36-40, May 1974.

A systematic air quality monitoring network was established in the Mizushima industrial area in 1967. Presently, 23 monitoring stations are functioning in Kurashiki and vicinity for suspended particulates and sulfur oxides. Nitrogen oxides are monitored by automatic meters at 9 locations which are connected with a telemeter. Oxidants are measured at 10 locations in Kurashiki. Data are being collected at various points for formaldehydes, hydrogen chloride, and ammonia. These monitoring stations are connected with the telemeter system at the prefectural government control office. In 1972, 81-97% measurements for suspended particulates passed the environmental standard of daily average of 0.1 mg/cu m, and 94-99% passed for the hourly average of 0.2 mg/cu m. Oxidant emergency warnings (more than 0.15 ppm) were issued three times in 1972 and 14 times in 1973. Based on the simulation study of 1972, the projected figure for the total SOx emission in 1975 will be 6262 N cu/hr, and the goal is set to decrease this to less than 6000 N cu m/hr by 1975. In August 1973, the seven largest industries emitting 90% of the area's total SOx emissions were given allocations for maximum permissible emission standards. According to this, from 20% to 50% reductions of emission are requested if an emergency occurs.

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Korenevskaya, Y. I. and E. M. Saak yants

APTIC NO. 61095

PROBLEM OF PARKING PRIVATE CARS IN A RESIDENTIAL BLOCK. (K voprosu o razmeshchenii individualnykh avtomobiley v zhiloy zastroyke). Text in Russian. Gigiena i Sanit., no. 1:23-26, 1974.

Environmental problems of the parking of cars in residential blocks are discussed. Cars parked in residential blocks cause nuisances due to exhaust gas and gasoline vapor emissions and by noise on arrival and during starting. The action radius of air pollution generated under such conditions may be set at 50 m. The carbon monoxide concentrations measured at distances of 3 m, 5 m, 10 m, 50 m, 40 m, and 75 m from an idling car were 250 mg/cu m, 87.5 mg/cu m, 37.5 mg/cu m, 18.8 mg/cu m, 6.3 mg/cu m, and 1.3 mg/cu m, respectively. The best solution to the pollution problem is the use of underground garages with adequate exhaust systems.

37625

Kubota, Torahide

APTIC NO. 61570

DEVELOPMENT OF POLYMER CHEMICAL INDUSTRY AND ITS ASSESSMENT FROM THE STANDPOINT OF POLLUTION. (Kobunshi kagaku kogyo no hattan to kogai kara no asesumento ni tsuite). Text in Japanese. Kankyo Sozo (Environ. Creation), 4(4):27-36, April 1974.

Air pollution control plans required of plastic industries include inspections of monomer synthetic process by-products and their toxicity, toxicity of refining low-boiling point gas, photochemically reactive gas, polymer process separation gas, plastic waste incineration combustion gas, and treatment of all these harmful gases. Industries are responsible for producing potentially toxic material by utilizing materials including hydrogen chloride, heavy metals, nitrogen oxide, sulfur oxides, and dusts. Plastic products and potential pollutants,

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plastic coloring materials and pollution factors, and various polymer compound additives and pollutants are presented in tables. Even with photodegradable plastics and radio-degradable materials, food, air, water, and human health are threatened, especially if degradation occurs while the products are still in use. Degraded materials still produce HCl, hydrogen fluoride, ammonia, COCl₂, carbon monoxide, and formaldehyde. The better the product, the harder the treatment and the more chances for pollution; therefore, the future of polymer products must be based on the environmental safety even if it means inferior products. The distribution-sales flow must include recovery and reuse, and the manufacturing process must include material recovery and recirculation systems.

37626

APTIC NO. 61457

Lange, Karlheinz

DIESEL ENGINE COMBUSTION WITH SPECIAL REGARD OF WALL APPLICATION OF THE FUEL. (Dieselmotorische Verbrennung unter besonderer Berücksichtigung der Wandauflagerung des Brennstoffes). Text in German. Motortech. Z. (Stuttgart), 35(2):41-46, 1974. 5 refs.

Diesel engine combustion was studied in an experimental engine which permitted the optical observation of ignition and combustion. Apart from recording the spectral radiation in the combustion chamber high-speed films were taken, the pressure characteristics were measured and the engine parameters determined. With the pressure characteristics the combustion characteristics were calculated. At all combustion processes only the red solid state radiation could be made out on the films. Radiation measurements indicated, however, that every combustion began with a blue radiation, which persisted through the entire combustion process. The spectral distribution shows a maximum in the red and a second lower one in the blue-green range. The engine parameters for an injection begun at maximum medium pressure are dependent on the direction of injection and thus on the fraction of fuel applied to the wall. With an injection angle of 45 degrees which leads to a concentration of the fuel in the zone of highest air velocity, the highest medium pressures are achieved. The exhaust gas turbidity assumes lowest values at an injection into the external air ring. Because of the high pressure and temperature level nitrogen oxides emissions is high, however. Unburned hydrocarbons and formaldehyde rise with increasing wall application. A deviation from the injection angle which yields favorable values for medium pressure and exhaust gas turbidity causes the peak pressure and emission of nitrogen oxides to drop both at increasing air distribution and at increased wall application. A decrease of the pressure increase can be achieved only with increasing wall application. Heavy wall application, however, raises the exhaust gas turbidity and increases the emission of unburned hydrocarbons.

37627

APTIC NO. 60374

Maier, H.

CONSTRUCTION OF THE NEW CEMENT WORKS AT SCHELKLINGEN - PLANNING AND BUILDING. (Neubau des Zementwerkes Schelklingen - Planung und Errichtung). Text in German. Aufbereitungs Technik, 27(3):102-110, 1974. 4 refs.

The layout at the newly enlarged Schelklingen cement works is described. Two roll mills are fed via a proportioning station where the additional components are added. The waste gases from the preheater are utilized for drying the raw material. At times when the grinding mills are not in operation, these waste gases are instead conditioned in evaporative coolers before entering the electrostatic precipitators. The raw meal silos are of the two-story type. In the upper part of the silo the meal for feeding to the kiln is homogenized and stored in the lower part of the silo. The rotary kiln is equipped with a cyclone preheater and a planetary cooler. The kiln plant can be fired

either with natural gas or with heavy oil, or with the two fuels in combination.

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APTIC NO. 61231

Masek, V.

HYDROGEN CYANIDE IN THE AIR OF WORKING PLACES OF COKING PLANTS. (Cyanwasserstoff in der Luft der Kokerei-Arbeitsplätze). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 24(4):101-105, April 1974. 12 refs.

The methods available for the measurement of hydrogen cyanide (HCN) in air are reviewed. A colorimetric method was used for analyzing the HCN concentration in 54 samples of three coking plants. The highest HCN concentration was measured at those places where ammonium sulfate is obtained from crude coking gas with the aid of sulfuric acid. The HCN emission at the individual stages of the coking process is discussed in detail. The largest amount of HCN was emitted from the cooling process of the water which flows from the terminal coolers of the coke oven gas. The HCN concentration of the hot crude gas after leaving the coking chamber is slightly reduced by the following cooling. The largest reduction is achieved at the terminal cooling process through direct contact of the gas with the water. The quantity of HCN emission at the following water cooling process is estimated to amount to between 7 and 15 kg/hr.

37629

APTIC NO. 60986

Menslage, O.

PLANNING, CONSTRUCTION AND STARTING A 3000 TONS/DAY CEMENT WORKS AT BECKUM. (Planung, Bau und Inbetriebnahme eines 3000 t/d Zementwerkes in Beckum). Text in German. Zement-Kalk-Gips (Wiesbaden), 27(3):93-101, 1974.

The construction of the new Mark II Dyckerhoff cement works at Beckum is described and the results obtained in its first year of operation are reported. Problems of environmental protection against pollution are given particular attention. First, questions pertaining to plant location are discussed. Next, the process technology and the problems associated with building and starting the plant are dealt with more fully. Nowadays the pollution sensitivity of the adjacent environment is a significant additional point to be considered. The type of utilization of adjacent areas, their pre-existent pollution load and their distance from the polluting source must be taken into consideration. An increasing tendency on the part of the population to raise objections is now liable to affect the duration and the results of a licensing procedure. The operating license has been granted on condition that the dust concentration in the furnace off-gases be monitored. If the set limit value of 120 mg/cu m is exceeded the rotary kiln is automatically switched off. The dust emission from the cement mill is likewise monitored and the mill switched off if a concentration of 75 mg/cu m is exceeded. For maintaining the set limit values at all times the electrostatic precipitator was divided into three sections which operate independently from each other. The limit value is not exceeded even if one of the three sections fails. The waste air from the cement mill has a dust concentration of 500 g/cu m which is removed in a cyclone followed by an envelope type of cloth filter.

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APTIC NO. 61214

Reichardt, G.

FROM DUMPING TO INCINERATION - STEPS OF A LARGE CITY CONCERNING WASTE DISPOSAL. (Von der Deponie zur Müllverbrennung - Wege einer Grossstadt in der Müllbeseitigung). Text in German. Tech. Mitt., 67(1):23-25, Jan. 1974.

Plans for a cooperative incinerator serving the cities of Wuppertal and Remscheid are outlined. Utilization of all available disposal sites necessitates the construction of a five-incinera-

tor complex which is expected to be completed in 1975. Each incinerator will have a throughput of 15 tons/day. Electrostatic precipitators will be installed to control dusts in the flue gases. Waste heat will be used for power generation. Loading and unloading of the garbage will be done in a completely closed building to avoid a spread of dusts and odors.

37631

APTIC NO. 61405

Rijswijk de Jong, W. E. van

THE BILLITON TIN VOLATILIZING PROCESS. (Das Billiton- Zinnverfluechtungsverfahren). Text in German. *Erzmetall. Z. M.*, 27(1):22-28, 1974. 4 refs.

The Billiton tin volatilizing process is based on the principle that sufficient phosphorus is present in the charge to bind the iron as iron phosphide and that enough sulfur is available to volatilize the tin liberated from the iron as sulfide. This process has meanwhile been patented and tested in an experimental plant. The tin losses are about 2% of the iron contained in the charge. The waste products are a silicate slag, ferro-phosphorus and sulfur dioxide waste gas. The power consumption amounts to 1500 kWh per ton crude material. Measurements of the waste gas composition directly behind the furnace revealed a high dust concentration, a low waste gas quantity, and a high SO₂ content. With tightly sealed furnace 4 to 5% SO₂, 23% carbon dioxide, and less than 1% oxygen were measured in the waste gas. The dust concentration measured 300 g/cu m at a gas quantity of 550 cu m/h. At untight furnace conditions 3% SO₂, 180 g dust/cu m and 999 cu m gas/h were measured.

37632

APTIC NO. 60377

Roth, Philip M., Philip J. W. Roberts, Mei-Kao Liu, Steven D. Reynolds, and John M. Seinfeld

MATHEMATICAL MODELING OF PHOTOCHEMICAL AIR POLLUTION-II. A MODEL AND INVENTORY OF POLLUTANT EMISSIONS. *Atmos. Environ.*, 8(2): 97-130, Feb. 1974. 28 refs.

A general methodology for the compilation of a contaminant emissions inventory for an urban area is presented, and a model for predicting the dynamic behavior of photochemical air pollution is used for estimating the spatial and temporal distribution of carbon monoxide, hydrocarbon, and nitrogen oxide emissions in the Los Angeles airshed during the autumn of 1969. Average daily emission rates of NO_x, organic gases, and CO for the period are listed for mobile sources (motor vehicles and aircraft) and industrial and non-industrial stationary sources. The greatest uncertainty in the calculation of motor vehicle emissions which constitute the most important single source of pollutants in the region to which the model was applied appeared attributable to an inability to assess the representativeness of a driving cycle. The principal problem associated with fixed source emissions was a lack of data; few measurements of effluent concentrations were made, and there was virtually no data available to reflect the effect of process variations on emission rates.

37633

APTIC NO. 60351

Saito, T.

UNLEADED GASOLINE AND AUTOMOBILE ENGINES. (Gasolin no muen-ka to jidosha enjin). Text in Japanese. *Jidosha Gijutsu (Automobile Eng.)*, 28(1):50-55, Jan. 1974. 36 refs.

The Ministry of International Trade in Industry has issued a notice requiring the petroleum industry to supply unleaded gasoline beginning in April 1974. Although the investigation of the Yanagicho case did not reveal unduly high blood Pb levels, increased tetraethyl lead use leads to increases in Pb in air, water, and soil and there is no assurance that these increases will not adversely affect human life. In addition to lead, lead salts are also present in engine exhausts, about 40% of which is present in particles of a size which easily invades the lungs.

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It will be necessary to increase the hydrocarbon content of gasolines when tetraethyl lead is no longer added, and this will increase nitrogen oxides content of the exhaust (but not carbon monoxide or photochemical reactivity). An increase in aromatic hydrocarbons in gasoline will lead to an increase in aromatic aldehydes, benzopyrene, related phenols, and minute particulates in exhaust gases. An attempt should therefore be made to find substitutes for aromatic hydrocarbons in gasoline.

37634

APTIC NO. 61238

Schwanecke, Rudolf

EMISSION FROM HOT GALVANIZATION. (Emissionen aus Feuerverzinkereien). Text in German. *Wasser Luft Betrieb*, 18(4):208-211, 1974. 5 refs.

About 150 hot galvanization plants are in operation in Germany which maintain about 15,000 tons of zinc in a liquid state at all times. The emissions from these plants include gaseous and dust emissions, aqueous pollutant emissions, and noise. The air pollutants emitted by these plants include ammonium chloride mists, zinc ash, hydrochloric acid, pickling bath mists, and sulfur dioxide. Measurements yielded a particulate emission of 65 to 480 mg/cu m, a fraction of chlorine components between 18 and 100 mg/cu m, and an NH₄ fraction of 20 to 165 mg/cu m. The specific sulfur dioxide emissions from the galvanization furnace amounts to about 130 g/t galvanizing material. About the same amount of SO₂ is emitted by the drying furnace. The emissions can be reduced by drawing them off at the point of origin and cleaning in scrubbers. The venturi scrubber has proved most suitable. With a collection efficiency of 75 to 85%, the pollutant concentration is reduced to about 50 mg/cu m, and there is a reduction of the relative emission to 0.374 kg/t galvanizing material.

37635

APTIC NO. 61406

Voss, Alfred

UNUSED NON-POLLUTING SOURCES OF ENERGY? (Ungenutzte umweltfreundliche Energiequellen)? Text in German. *Elektrizitaetswirtschaft*, 73(2):19-27, 1974. 18 refs.

An evaluation of the role of various energy sources for future energy supply shows that the present percentage of water power of 6% will not rise any further despite increasing demands and largely unused potentials. The largest water bodies suitable for power production are located in the underdeveloped countries. Geothermal and tidal energies are so low that they will not be able to cover any major power demands. Solar energy is an enormous inexhaustible source for energy. Its use is prevented by still unsolved technical problems and high costs. All sources of energy, with the exception of extraterrestrial solar energy, are bound to a certain location which makes the supply of power over large distances with enormous losses necessary. Also these sources are not so non-polluting as is always claimed. Extraterrestrial power plants for example pollute the atmosphere in a way similar to that of fossil, and nuclear power plants with waste heat. Geothermal sources emit hydrogen sulfide and other vapors which cause environmental pollution problems such as corrosion. An uninterrupted further development of nuclear power is needed to meet rising demands and guarantee certainty of the power supply.

37636

APTIC NO. 60982

Wasmund, R. and I. Roggan

FUNDAMENTAL CONCERNING THE HAZARD OF DUST FIRES AND DUST EXPLOSIONS IN THE FOOD INDUSTRY. (Grundsatzliches ueber die Gefahr von Staubbraenden und Staubexplosionen in der Lebensmittelindustrie). Text in German. *Deut. Lebensm. Rundsch.*, 70(3):93-99, 1974. 50 refs.

The danger of dust fires and explosions occurs in the food industry. These dangers are reviewed. There are natural and

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technical dusts. Technical dusts are either desired (cement, gypsum, fertilizer, flower, powdered sugar) or undesired (fly ash, industrial dust, from erosion). Dusts have a high reaction speed and low heat conductance and can be easily agitated through turbulent gas (air). Each dust is characterized by its grain size distribution which may be either a Gaussian distribution or any other. Since the inflammability of dusts depends on the grain size, distribution dusts must be characterized by the prevalent particle size and the maximum particle size. The settling speed of dust depends only on its grain size, provided all particles have the same density. Because of their large specific surface and their structural design, dusts are able to adsorb gases. For determining the inflammability of dusts, they must be examined as to their chemical composition and the concentration of volatile matter, ash, and moisture. Furthermore, the combustion heat, the average particle shape and size, the size distribution, the maximum grain size, specific surface, bulk density, interstitial volume, ignition point, and wettability must be determined. For assessing the hazard of dust depositions, the tendency toward self-heating, self-ignition at higher ambient temperature, and the inflammability in presence of sparks and flames must be known. For determination of the fire hazard of a dust/air mixture, the minimum ignition energy is important. The minimum ignition energy does not come from a single ignition source, but results from all energy sources acting on the dust/air mixture. The parameters characterizing the explosion of a dust/air mixture are briefly discussed.

APTIC NO. 61514

37637

Weisheit, W. and S. Neuss

A CAUSE FOR DIRT IN ROOMS WITH ROOM HEATERS. (Eine Ursache von Verschmutzungen in Räumen mit Raumheizgeräten). Text in German. *Gesundh.-Ingr.*, 95(1):1-10, 1974. 15 refs.

In many rooms equipped with individual heaters which are operated with various kinds of energies, a brown to black film is found on walls, furniture, and on the heaters themselves. With gas heating automats, which were used as example, the cause for this dirt was determined. Organic dust particles decomposed on the hot combustion chamber surface. The pyrolysis products then caused the observed dirt film. The decomposable dusts found in homes consisted of cellulose dust and/or wool fibers. The cellulose dust was contained in street dust and was carried into the rooms. The examinations were carried out with the aid of thin-layer chromatography and infrared spectroscopy.

37638

APTIC NO. 60438

DUST TECHNOLOGICAL FUNDAMENTALS OF THE CONSERVATION OF CLEAN AIR. (Staubtechnologische Grundlagen zur Luftreinhaltung). Text in German. *Wasser Luft Betrieb*, 18(1):30-31, 1974. 3 refs.

The dusts contained in waste gases and waste air have a large range of grain sizes. Knowledge of the grain size distribution is one of the most important factors for selection of a suitable dust collector. The number of particle shapes is extraordinarily large. The exact determination of the particle or grain size is problematic. Of fundamental importance for the physical properties of dust systems are the laws of motion of dust particles. Solid particles move by themselves due to electric and magnetic forces, heat inertia and air movements. They may be carried long distances before they fall out. The laws providing protection against dust emissions include paragraph 16 of the trade law for heavily-emitting industrial plants which require licensing, paragraph four of the traffic regulations, the emission protection laws of the states of Baden-Wuerttemberg, Bavaria, Bremen, Lower Saxony and Rhineland Palatinate, and the regulations concerning execution of the state emission protection laws with respect to incinerators, oil-fired furnaces, dry cleaners, tar cracking plants, and domestic heaters. These

regulations are not far-reaching enough for plants which do not require licensing because only six states include them in the regulations, for domestic heaters because only two states have passed regulations, and for automobiles because the standards are behind the present state-of-the-art.

37639

APTIC NO. 61134

SOLID WASTE DISPOSAL, A CENTRAL PROBLEM OF THE PRESENCE. (Abfallbeseitigung, zentrales Problem der Gegenwart). Text in German. *Wasser Luft Betrieb*, 18(2):80-87, 1974.

Various kinds of incinerators are discussed. Special oil incinerators burn even heavily polluted oil without emitting smoke, soot, or odors. Paper incinerators are equipped with afterburners to remove dusts. A three-channel boiler incinerates wood chips, plant fibers, plastics, dusts, peat, cardboard, gases, or oils. An incinerator has been developed which converts chlorinated hydrocarbons to hydrochloric acid, chlorine, carbon monoxide, and water. Sludges with a water content of 50-95% can be dehydrated to water concentrations of 5-15% by a special incinerator comprising a sludge mixer, a sludge feeder, a drying drum, a separator, and a dust collector. Trash and combination trash and sludge incinerators are described.

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APTIC NO. 61449

Tokyo Metropolitan Government (Japan), Pollution Control Bureau

INVESTIGATIONS OF DUST EMISSION FACILITIES. (Funjin hassei shisetsu chosa kekka). Text in Japanese. 68p., Jan. 1974.

An investigation was conducted in Tokyo on 165 dust emission sources. The facilities surveyed included storage yards for sand, clay, coal, cokes, and nickel ores; coke ovens; conveyors; and grinding machines. The largest coke oven had a capacity of 2000 tons/day, and it was equipped with a venturi scrubber, a rotocyclone and a collision-type collector. At most of the storage yards, sprinklers were used to spread water as a way of dust prevention. Approximately 70% of the conveyors used water as a method of dust prevention. Cyclones and bag filters were used in all the grinding machines. There were complaints concerning 7.9% of the facilities. However, all have been resolved by the improvement of dust collection techniques on the part of the owners.

1973

37641

APTIC NO. 60958

Brosset, C.

INFLUENCE OF THE AIR POLLUTION. European Liaison Committee for Cellulose and Paper, Proc. EU-CEPA Conf., 15th, Harmonizing Pulp Paper Ind. Environ., Rome, 1973, p. 112-136, 178-181. 6 refs. (May 7-11.)

The problems of sulfur dioxide and odorous sulfur compounds in pulp and paper industries of Sweden are discussed. That industry is responsible for about 25% of the total SO₂ emissions in Sweden. The standards for maximum ambient air concentration for SO₂ are a 5 ppm monthly mean, a 10 ppm 24-hour mean, and a 25 ppm half-hour mean. There is reason to believe that damage caused by SO₂ (exclusive of vegetation) is mainly associated with atmospheric oxidation. This may lead to less emphasis on the concentration of SO₂ in air, and more emphasis on actual emissions. The relevant odorous compounds are hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. None of these compounds are emitted in concentrations that form health hazards, but the emissions often lead to very irritating odor episodes. There are no recommendations in Sweden as to what is acceptable on the strength, duration, and frequency of odors. Tests are being conducted with the U. S. Environmental Protection Agency's method based on a combination of gas chromatography and

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flame photometry for determination of gaseous sulfur compounds to ascertain whether there is a closer relationship between observed concentration and odor perception. The results indicate the problem is very complex.

37642

APTIC NO. 60842

Capman, Howard W.

ECOLOGICAL CONSTRAINTS ON FUEL USE. Preprint, 12p., 1973. (Presented at the Pennsylvania Industrial Fuel Efficiency Seminar, Harrisburg, Pa., Aug. 22, 1973.)

The problem of satisfying a reasonable demand for energy and keeping the environment pollution-free is discussed. Pollution comes from automobiles, the paper industry, mining, and other sources. The Federal Clean Air Act has established particulate ambient air quality standards of 75 and 60 micrograms/cu cm annual average as primary and secondary standards, and 260 and 150 micrograms/cu cm maximum 24-hour primary and secondary standards, respectively. These standards are 0.3, 0.2, .14, and .10 ppm for sulfur dioxide, respectively. The 3-hour SO₂ secondary standard is .50 ppm. Emission standards were developed to attain the air quality standards, and implementation plans were set up. The emission standards require that coal use be restricted in Pennsylvania. In the four most restrictive air basins, the permissible sulfur content in coal without flue gas control ranges from 0.4-0.65%. In the remaining eight air basins, the maximum sulfur content allowed is 1.2-1.9%. Control of SO₂ can be accomplished by removing sulfur from coal by washing and by removing SO₂ from stack gases. Since there is not enough time for the states to meet the clean fuel standards by 1975, the Environmental Protection Agency has extended the compliance dates and allowed users to redistribute low-sulfur fuel supplies. Ecological damage caused by coal mining and laws to control it in Pennsylvania are mentioned. The problems of radioactive effluents from nuclear power plants, power plant siting, and cooling requirements are mentioned. The use of nuclear power plants, geothermal power, heat recovery, and other sources of energy may solve the problem of air pollution by eliminating the need for as much fossil fuel use.

37643

APTIC NO. 60818

Cosby, John C.

HEAVY DUTY VEHICLE DRIVING PATTERN AND USE SURVEY. FINAL REPORT: PART I, NEW YORK CITY. Smith (Wilbur) and Assoc., Columbia, N. C. Office of Air and Water Programs Contract 68-01-0414, APRAC CAPE 21-71, APTD-1523, 106p., May 1973.

NTIS: PB 221656

The composition, function and travel behavior of urban truck travel in New York City was identified. Stratifications were organized which will be used to develop representative truck use patterns for development of emission tests. The sources of information were existing literature, vehicle registration records, urban truck weight studies, comprehensive urban area transportation planning studies, fleet operator statistics, and other available data sources. Meaningful characteristics of the urban truck population were assembled from the information by detailed stratification and analysis to reduce and simplify the number of categories of trucks and the kinds of travel they perform. The travel performed by each of the major classes of vehicles were examined in relation to place and time and extent of use, type of street traveled, place and length of time at rest, vehicle miles of travel by geographic unit of area and street type, and land use traversed. Two general sets of data resulted- the general characteristics of truck use and the spatial patterns of truck use on the street network.

37644

APTIC NO. 60820

Duel, M. and C. H. Elder

DEGASIFICATION THROUGH VERTICAL BOREHOLES. Bureau of Mines Information Circ., no. 8621:73-82, 1973. 6

refs. (Presented at the Bureau of Mines/Industry Technology Transfer Seminar Symposium, Morgantown, W. Va., May 30-31, 1973.)

The importance of dewatering in degasification of coal beds through vertical boreholes is examined, and progress to date on such work is summarized. Currently, the Bureau of Mines is completing a comprehensive program to test candidate coal beds and to produce gas from these coal beds along projected development areas of existing and newly developing mines throughout the United States. All of the holes on production yield water and gas, though water in the fractures and macropores of the coal beds reduces the flow rate of gas from the bed. Consequently, all of the drill holes are outfitted with pumps to remove the water intermittently. A decline in water flow rate, with all other factors being equal, causes an increase in gas flow rates from the vertical boreholes. Gas samples have variable compositions depending upon location; but typical samples from Northern Appalachian sites range from 90.7-99.1% methane, 0.0-0.6% oxygen, 0.7-1.8% nitrogen, and 0.0-7.3% carbon dioxide. Gas production up to April 1, 1973 has ranged as high as 1,900,000 for one mine in Pittsburgh where five holes have been drilled.

37645

APTIC NO. 60561

Eckard, S. E. and R. D. Brooks

DESIGN OF RECIPROCATING SINGLE CYLINDER EXPANDERS FOR STEAM. FINAL REPORT. General Electric, Cincinnati, Ohio, Nuclear Systems Programs, Office of Air and Water Programs Contract 68-01-0408, Rept. Environmental Protection Agency-460/3-73-003, 235p., Oct. 1973. 59 refs.

NTIS: PB-231004/AS

Several solid lubricants and wear-resistant materials were tested in a single cylinder steam expander of both the crosshead piston and trunk piston configuration for the purpose of evaluating such materials for use in a Rankine cycle automotive propulsion system utilizing a water-base fluid. Best results were obtained with graphite (CCSA) rings rubbing against a hardened Type 440-C cylinder liner in the crosshead expander, and solid lubricants generally appeared to be potentially applicable as ring, cylinder, and other components in a high temperature reciprocating expander. A synthetic hydrocarbon crankcase lubricant performed well through all the tests, providing adequate lubrication at bulk oil temperatures up to 230 F. (Author abstract modified)

37646

APTIC NO. 58370

Fujiyoshi, Kaichi, Takashi Niwa, Masakatsu Kajikawa, and Tomokuni Hayakawa

FLUORIDE EXHAUSTED FROM SEVEN TYPES OF CERAMIC INDUSTRY. (Tojiki kankei kojo no gyoshu betsu ni yoru fusso kagobutsu no haishutsu ni suite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):360, 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 104.)

Emission gases from ceramic factories were investigated by seven classifications of refractory bricks, mosaic tiles, exterior tiles, interior tiles, dishes, glazed roof tiles, and unglazed roof tiles. The JIS method of measurement and analysis were used. The hydrogen fluoride emission from refractory brick kilns were especially high, at 48 ppm. Mosaic tile plants emitted less than 5 ppm of HF. All tiles using glaze (exterior, interior, dishes, glazed tiles) emitted relatively high concentrations of HF (around 10 ppm). The causes were probably the chemical agents used for lowering the melting point. Unglazed tiles are baked in a single-process kiln, and the temperature seemed to affect HF emissions very much. At one kiln, when the kiln top temperature was 500-600 C, HF emission began to increase from 0.66 order to 6.4 ppm order, and reached the highest concentration of 110-320 ppm at 800-900 C. However, at another kiln of the similar type, HF began to decrease at 600 C, and at 800 C, 85% of the total emission was diminished.

37647

APTIC NO. 61487

Fukura, Masayoshi and Tadaaki Kubo

ENVIRONMENTAL REQUIREMENTS AND CONTROL MEASURES IN MOTOR VEHICLE PLANTS. (Jidosha kojo ni okeru kankyo seibi to taisaku). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 27(11):1238-1245, Nov. 1973. 4 refs.

Pollutant emissions and the control measures taken to contend with them are reviewed. According to a survey covering 480 plants in Osaka, 32.6% monitor the air quality, 52.4% monitor the water quality, and 28.7% measure the noise and vibration. Effluents of various kinds are discharged from casting, machining, assembling, and painting processes. The machining and painting effluents are characterized by fluctuating pH, high oil content, and high biochemical oxygen demand, while those from the casting processes have a high concentration of suspended matter, high biochemical oxygen demand, and black color due to the high carbon content. In one case the effluent had a pH of from 5.3-10, a transparency of from 2-6 cm, a biochemical oxygen demand of 30-100 ppm, a chemical oxygen demand of 20-120 ppm, suspended substances of 50-100 ppm, and oil content of 20-100 ppm. Water treatment methods discussed include, active carbon adsorption, treatment with sludge, and photooxidation. Air pollutants emitted from painting facilities include toluene, xylene, benzene, formalin, acrolein, and phenol. To control the air pollutants adsorption, direct combustion, and catalytic combustion are recommended. Control methods for nitrogen oxides are also discussed.

37648

APTIC NO. 60496

Garibaldi, P., C. Maitz, A. Polletta, and R. Vitali

LEAD COMPOUNDS EMITTED IN THE EXHAUST GASES. (Composes de plomb emis dans les gaz d echapement). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 983-993, May 1973. (Oct. 2-6.)

Results of a study on lead components in exhaust gases are described. The amount of Pb emitted in the exhaust gases from internal combustion engines was measured against the Pb content of the gasoline used. The amount of Pb remaining in the engine and in the exhaust system was also measured to give the total amount of Pb. Some trials were carried out to determine the variation in the grain size distribution of the Pb particles in the exhaust gases as a function of the Pb content of the fuel. These trials were carried out on the 1608 Fiat 125 S engine on a dynamometer. Two representative driving conditions were simulated in town and on the open road. The fuel used was similar in composition to super-grade fuels available on the market with the following lead contents: 0.6, 0.4, 0.3, and 0.15 g/l. The quantities of the pollutants carbon monoxide, hydrocarbons, and nitrogen oxides emitted were measured as a function of the Pb content of the fuel on the Fiat 125 S on the dynamometer.

37649

APTIC NO. 60988

Hagspiel, W.

ENVIRONMENTAL PROTECTION IN THE STONE AND EARTH INDUSTRY. GENERAL TECHNICAL AND ECONOMIC PROBLEMS OF THE ENVIRONMENTAL PROTECTION IN THE STONE AND EARTH INDUSTRY. (Umweltschutz in den Steine-Erden-Betrieben. Allgemeine technische und volkswirtschaftliche Probleme des Umweltschutzes aus der Sicht der Industrie der Steine und Erden). Text in German. Berg Huettenmaenn. Monatsh., 118(6):161-175, June 1973. 24 refs.

General technical and economic problems of environmental protection in the stone and earth industry in Austria are discussed. Dust emissions generated by the extraction, loading, handling, transportation, processing, and crushing of

mineral raw materials, are a major concern in the stone and earth industry. The dusts emitted may be in the respirable fraction and they contain variable amounts of silicogenic quartz, trydimite, and cristobalite. Adequate dust separators are now available for various equipment such as for screens, crushers, and conveyors. Exhaust gas emissions from motor-driven equipment and vehicles also cause environmental problems. Here, emissions can be theoretically abated by regular maintenance and adjustment, improved atomization and fuel distribution, and by lowering of the lead content in gasoline.

37650

APTIC NO. 61540

Heek, Karl Heinrich van, Harald Juentgen, and Werner Peters

PRESENT SITUATION OF THE GENERATION OF GAS FROM COAL THROUGH STEAM GASIFICATION USING THE HEAT FROM HIGH TEMPERATURE NUCLEAR REACTORS. (Stand der Gaserzeugung aus Kohle durch Wasserdampfvergasung unter Nutzung von Hochtemperaturkernreaktorwaerme). Text in German. Erd-oel Kohle-Erdgas-Petrochem., 26(12):701-703, Dec. 1973. 18 refs.

Through the use of process heat from gas-cooled high temperature nuclear reactors for the endothermic steam gasification of coal and for the production of the necessary process steam it is possible to save coal as a supplier of heat and to use it only as raw material for the produced gas. The advantages are: lower costs of gas production compared with conventional processes in countries with high price rates for coal, sparing of coal reserves, and production of lower amounts of carbon dioxide in the gasification plant. In order to realize the project on a technical scale it is necessary to improve upon high temperature nuclear reactors for obtaining temperatures higher than 900 C. Suitable gas generators and methods of heat transfer must also be developed. The basic ideas for a gasifier, worked out by the Bergbau-Forschung in Essen, are presented here. The design of the gas generator based on experiments to determine the kinetics of coal gasification as well as heat transfer shows that it is possible to gasify coal on a large scale at helium temperatures exceeding 900 C.

37651

APTIC NO. 61154

Kremer, Hans

EMISSION FROM FIRING SYSTEMS. (Emission von Feuerungen). Text in German. Umwelt Aktuell, no. 4:29-44, 1973. 38 refs. (Presented at the Congress Umwelt 72, Stuttgart, Germany, June 30-July 9, 1972.)

The particulate and gaseous emissions from firing systems and their causes are reviewed. In the Federal Republic of Germany annually 1 million tons of particulates, 3 million tons of sulfur dioxide, 600,000 tons of carbon monoxide, 600,000 tons of nitrogen oxides, 130,000 tons of hydrocarbons, and about 10 tons of fluorine compounds are emitted by firing systems. Sulfur control measures include the removal of pyrite from coal and the hydration of heavy oil. The costs of these measures are estimated. Dusts can be satisfactorily removed in dust collectors. Nitrogen oxides can be reduced by near stoichiometric combustion, two- or more stage combustion, waste gas recirculation, and water injection.

37652

APTIC NO. 61537

Krolewaki, Harry

TECHNICAL AND ECONOMICAL PROBLEMS CONCERNING THE WASTE HEAT FROM THERMAL POWER PLANTS. (Technische und wirtschaftliche Probleme zur Frage der Abwaerme von thermischen Kraftwerken). Text in German. Wasserwirtsch., 63(11/12):363-371, 1973. 20 refs.

Because of the diminishing supply of fresh water in West Germany, new cooling methods such as dry cooling and wet cool-

ing are increasingly applied. From these two processes, heat is given off to the air and, in the case of wet cooling, water is emitted into the atmosphere. The droplet emission can and should be reduced in water traps. By means of special collectors, the droplet emission could be reduced to less than 0.002% of the circulating water quantity. Power plants operated with fossil fuels have a maximum efficiency of 42%. Modern power plants emit, on the average, 1200 kcal of waste heat/kwH. A drastic reduction of the waste heat emission could be achieved with high temperature reactors and with helium turbines directly in the gas circulation path. Unfortunately, development has not yet progressed far enough to bring any major relief in this and the coming decade. Compared to fresh water cooling, the capital investment costs for wet cooling will rise to more than 104% for dry cooling to more than 115% in fossil-fired power plants; in nuclear power plants they will climb to 125% with dry cooling. The power generation costs will rise to between 108.5 and 120%. Design problems of cooling towers are discussed.

37653

APTIC NO. 60650

Margetts, M. J. and F. M. Shofner

CHARACTERIZATION OF THE DRIFT EMISSIONS OF A NATURAL DRAFT COOLING TOWER AND EXAMINATION OF SENSITIVITY TO OPERATIONAL PARAMETER VARIATIONS. Babcock and Wilcox Construction Co., Copley, Ohio, Power Generation Group and Environmental Systems Corp., Knoxville, Tenn., Tech. Paper BR-1004, B74-03431, 29p., 1973. (Presented at the American Society of Mechanical Engineers/Institute of Electrical and Electronic Engineers/American Society of Chemical Engineers Joint Power Generation Conference, New Orleans, La., Sept. 16-19, 1973.)

Drift emission tests on a full-scale, operational natural draft cooling tower in which new design drift eliminators were installed are described. The measurements were made with recently developed testing techniques capable of accurately measuring both total mass emission and drop size distribution of the drift particles. The tests were the first to be conducted in the tower neck, a zone which is least affected by complex air currents. Salient results indicated that the mass drift emission levels of this tower are approximately 1% of the earlier guarantees on the order of 0.1-0.2% of the circulating water rate which could have resulted in an environmental problem. The tower tested provides cooling for a 250 MW coal-fired unit in a mine-mouth, electric generating plant. The total mass emission was 5500 g/min or drift fraction equal to 0.0011%; the mass emission for particles above 100 micron as 2000 g/min or drift fraction equal to 0.00041%; and the mass emission for particles above 200 micron was 1200 g/min or drift fraction equal to 0.00023%. These results are conservative, that is, the values given are larger than or equal to the actual values. (Author abstract modified)

37654

APTIC NO. 61524

Masek, Vaclav

THE TEMPERATURE AND FREQUENCY DEPENDENCE OF THE DIELECTRIC PROPERTIES OF FLY DUST FROM COKING PLANTS. (Ueber die Temperatur- und Frequenzabhaengigkeit der dielektrischen Eigenschaften von Kokerei-Flugstaub). Text in German. Staub, Reinhaltung Luft, 33(12):479-481, Dec. 1973. 4 refs.

In two large coking plants and their vicinity, 164 fly dust samples were collected at a total of 16 sampling points. The characteristic appearance of the dusts was determined with the electron scanning microscope. The dielectric properties were determined with a Schering-bridge and a vibration galvanometer. The results were obtained at temperatures of 120, 100, 50, and 23 C and at frequencies of 50, 200, and 1000 Hz. For hard coal samples the temperature of 120 C and the frequencies of 50 and 1000 Hz were applied only. With the latter, the dielectric properties improved with a reduction of the ash concentra-

tion. The majority of samples (67%) had a high conductivity which made any determination of the dielectric properties impossible. The phase angle dropped with declining temperature at all three measured frequencies. With a constant frequency of 50 Hz and rising temperature, the dielectric constant rose uniformly, with the frequencies of 200 and 1000 Hz it dropped.

37655

APTIC NO. 61176

May, H., E. Plassman, W. Mueller, and F. J. Dreyhaupt

RECENT RESULTS OF RESEARCH CONCERNING POLLUTANT EMISSION BY AUTOMOBILES. (Neuere Forschungsergebnisse ueber Schadstoffemissionen durch den Kraftfahrzeugverkehr). Text in German. Umwelt Aktuell, (4):75-89, 1973. 6 refs. (Presented at the Congress Umwelt 72, Stuttgart, Germany, June 30 to July 9, 1972.)

A representative cross section of 44 automobiles found in every day traffic in large cities (mainly passenger cars and a few trucks) was selected to determine the emission of carbon monoxide, unburned hydrocarbons, α -hexane, and oxides of nitrogen during all driving conditions with the aid of infrared analyzers. For trucks the average smoke value was also determined. The average concentrations of the various pollutants are plotted in a graph as a function of the average driving speed. The curves are significantly influenced by the operating state of the engine and the fuel-to-air-ratio λ . In a stationary state, during acceleration, and at low-speed driving, Otto engines are operated with a considerable lack of air which produces high concentrations of carbon monoxide and unburned hydrocarbons. With increasing average speed the CO and hydrocarbon concentrations drop and the NO concentrations rise because of the higher combustion temperatures in the cylinder and the excess air. The exhaust gas volume also rises and shows a linear dependence on the average speed. The pollutant emissions per time unit and automobile are quite different from the emissions/l of fuel. With increasing speed the emission of CO, hydrocarbons, and oxides of nitrogen increase progressively. The NO emission factors increase significantly. At an average speed of 50 km/hr approximately 14 times as much NO is emitted than at idling speeds. For trucks the anticipated rise of the CO concentration with increasing load was confirmed. The NO concentration show the same tendency while the concentration of unburned hydrocarbons changes insignificantly over the entire operating range.

37656

APTIC NO. 61588

Miyamoto, Toshio, Koichi Saito, Eiji Ebisawa, and Katsuhisa Taguchi

STUDIES ON CYANIDES IN VARIOUS EXHAUST GASES. (Kakushu haigasuchu no shian ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):324, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 69.)

Measurements of cyanides in automotive emission gases were taken using various fuels and cars, and the measurements were compared with CN from other sources. The test gases were sampled with an absorption jar with G-3 filters, with 2% caustic soda (100 ml), and the gas was drawn from the muffler at the speed of 1-2 l/min. The CN was measured by the pyridine-pyrazolone method. Propane cars emitted higher concentrations of CN compared to gasoline cars. Cars using a mixed gas and rotary engine cars emitted several times more CN than regular automobiles. During a combustion experiment of lubricants no CN was detected in the combustion gas; this may be due to the combustion condition and further studies are needed on lubricants. Older cars with more mileage emitted a much higher concentration of CN. Blowby gas contained a traceable amount of CN. The concentration of CN in automotive emissions is relatively high compared to other emission sources such as urban refuse incinerators.

EMISSION SOURCES

37662

37657

APTIC NO. 68562

Mullan, Joseph W.

PROJECTED COAL SUPPLIES UNDER ENVIRONMENTAL CONSIDERATIONS. Preprint, Air Pollution Control Assoc., Chicago, Ill., 9p., 1973. (Presented at the Air Pollution Control Association, Annual Meeting, 66th, Chicago, Ill., June 26, 1973, Paper 73-64.)

The amount of coal available to the United States and its possible end use are related to environmental demands. An estimated 65% of the 3.2 trillion tons (150 billion tons recoverable) of total remaining coal resources contain 1% sulfur or less, although the percentage of bituminous reserves meeting the 1% sulfur content is only 30%. Major tonnages of low-sulfur bituminous coal are in Alaska, Colorado, New Mexico, Utah, Washington, and Wyoming; hence, little of the low sulfur bituminous coal is near the present hungry markets in the Midwest and the East. Another important limiting factor is the fact that sub-bituminous coal and lignite are not only low in sulfur but also comparatively low in heat value. Many air pollution control ordinances have fixed their sulfur limits at a fraction of a pound per million Btu of plant input; thus the lower Btu coals thus predominate in the West face a tighter restriction on sulfur by weight than even the Eastern or Mid-western high sulfur, high Btu coals. The Environmental Protection Agency estimates an annual deficit of at least 100 million tons of coal, conditional upon the availability of additional clean fuel supplies and stack gas desulfurization systems. Otherwise, the annual low-sulfur coal gap could widen to 250 million tons.

37658

APTIC NO. 61592

Nagata, Katsuya, Yuji Honma, and Kumito Yamazaki

STATISTICAL STUDY ON THE CONTRIBUTION OF MOBILE AND STATIONARY SOURCES ON ATMOSPHERIC NOX CONCENTRATION. (Taikichu no NOx nodo ni taisuru ido haishutsugen to kotei haishutsugen no kiyodo ni tsuite no tokeigakuteki kosatsu). Text in Japanese. Jidosha Gijutsukai Ronbunshu (Proc. Soc. Automotive Engrs.), 4(6): 27-34, Nov. 1973. 7 refs.

Regression analysis was applied to the data measured at four air pollution monitoring stations in Tokyo. It was assumed that the only source of ambient carbon monoxide is the automobile, the source of sulfur dioxide is stationary combustion process, and that nitrogen oxides are emitted from both sources. In the center of Tokyo, the degree of contribution of the automobile is about 2 times as high as the stationary sources, but in the outskirts (industrial area) both sources contribute approximately equally. The results obtained by this method agree with the actual situation for both NOx sources.

37659

APTIC NO. 61564

Nakagawa, Yoshihiro, Isho Mitsuki, and Takei Takada

ATMOSPHERIC POLLUTION BY FLUORINE COMPOUNDS IN A DISTRICT AROUND A CERTAIN IRON MAKING FACTORY. (Bo-seitetsu kojo shuben chiku ni okeru fusso kagobutsu ni yoru taiki osen). Text in Japanese. Hyogo-ken Kogai Kenkyusho Hokoku (Rep. Environ. Sci. Inst., Hyogo Prefect.), no. 3:47-51, Dec. 1973. 6 refs.

Although it is not known popularly, steel making factories usually discharge considerable amounts of fluorine compounds as silicon tetrafluoride or hydrogen fluoride because the factories use calcium fluoride as an extension or slag forming agent. The atmospheric pollution in the neighborhood of a steel plant was examined through the analysis of water soluble hydrogen compound contained in suspended particulates as well as through the determination of fluorine in plant leaves. The method used for the determination was that proposed by Thompson et al. (JAPCA, 21(8) 484-487(1971)). The content in air was 0.211-1.012 micrograms/cu m and the origin of this fluorine was the factory wastes. The correlation between

fluorine and various heavy metals such as iron, manganese, and zinc was meaningful. The fluorine content in the leaves of sultan & parasol, Firmiana platanifolia, was 2.30-39.62 micrograms/g leaves. The concentration increases as the location of a tree neared the factory. The values obtained by the colorimetric method and by the ionic electrode method agreed well with each other. Therefore, the ionic electrode method is superior to the other because this method is simpler. Comparison was also made of the Smith method and the Jacobson method.

37660

APTIC NO. 56922

Nakayama, Kanemitsu

NATURAL GAS AS A CLEAN FUEL. (Mu kogai nenryo toshite no tennen gasu ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(10):953-930, Oct. 1973.

Natural gas is a combustible gas which is constituted mainly of hydrocarbons, 80% of which are methane. Natural gas emits no pollutants, has a high heat of combustion, and requires only simple installations. Its deposits are estimated at 50 million million cu m, although production is only 1.3 million million cu m/yr. It is easily transported by tanker and conducted through pipes. There are magnetic, gravitational, and seismic methods of prospecting it. The demand is expected to amount to more than 100,000 million cu m/yr in 1985, while the present production is 2500 million cu m/yr, and 58% of that is used in the chemical industry.

37661

APTIC NO. 61476

Nishimura, Hajime

INDUSTRIAL ECOLOGY AS A TOOL FOR TECHNOLOGY ASSESSMENT. (Tekunoroji asesumento to shitenosangyo ekoroji). Text in Japanese. Preprint, Japan Society of Chemical Engineers, p. 345-348, 1973. 6 refs. (Presented at the Japan Society of Chemical Engineers, Autumn Conference, 7th, Nagoya, Japan, Oct. 13-16, 1973.)

The environmental changes due to the Suhonada industrial project are assessed by a load model, an environmental model, a social expense model, the relation between industrial production and waste compounds, the relation between reactions of waste compounds and the environment, and the relation between social effects and social expense. The Suhonada project will produce 20 million tons/yr of steel, 2.5 million BPSD of refined oil, 3 million tons/yr of petrochemicals, and 140 million kw/yr of electricity. The plant will emit sulfur dioxide, nitrogen, oil, and heavy metals as air and water pollutants.

37662

APTIC NO. 61562

Oya, Masaaki

EFFECT OF NITROGEN IN FUEL ON GENERATION OF NITROGEN OXIDES. (NOx hassei ni oyobosu nenryochu no chisso no eikyo). Text in Japanese. Kagaku Kogyo (Chem. Ind.), 24(11):1497-1499, Nov. 1973. 8 refs.

The effect of nitrogen content of a fuel on nitrogen oxides (NOx) emission generated by combustion of the fuel is discussed. Nitrogen compounds contained in a fuel come in two types: one being the basic type including pyridine, quinoline and their derivatives and the other the non-basic type including pyrrole, carbazole, indole and their derivatives. The naphthene base crude oil contains more nitrogen than the paraffin base crude oil. Nitrogen content of crude oil imported into Japan generally is about 0.1-0.3%. Assuming that all the nitrogen content of heavy oil is converted to NOx, concentration of NOx produced by combustion of N-1% heavy oil with an excess air ratio of 1.15 is estimated to amount to 1370 ppm. This indicates that the so-called fuel nitric oxide can account for a great deal of the total NOx emission. According to a study by Esso, the type of nitrogen compound contained in a fuel oil has no effect on conversion rate of its nitrogen content to NOx but the NOx concentration increases with higher ex-

cess air ratio. A study made by Martin and others shows that the conversion rate was 35-50% when the excess air ratio was 1.2 and the nitrogen content of a light oil fuel was 0.2-0.5%. An experiment conducted by Sema and others in which the conversion rate (from nitrogen to NOx) was studied by adding quinoline to C heavy oil showed that the conversion rate remained the same even when the nitrogen content changed in quantity. Nitrogen oxides decreased with lower excess air ratio. The conversion rate is found proportional to one-third of oxygen concentration in the range of oxygen concentration between 0.3 and 3%.

37663

APTIC NO. 05140

Pfaff, Roger O.

SWIFT AGRICULTURAL CHEMICALS, INC., BIRMINGHAM, ALABAMA. Environmental Engineering, Inc., Gainesville, Fla., Office of Air Quality Planning and Standards Contract, Rept. 73-FRT-6, 22p., 1973. 1 ref.

Emission measurements of phosphorus pentoxide, fluorides, particulates, and ammonia were performed at the outlet of the control system for the granulated NPK fertilizer plant at Swift Agricultural Chemicals in Birmingham, Alabama. Total particulates ranged from 0.04943-0.10764 gr/DSCF; while those for the probe, cyclone, and filter catch were between 0.02105 and 0.08459. Ammonia concentration at the outlet ranged from 0.00034-0.00050 gr/DSCF, and total fluorides varied from 0.00056-0.00101 gr/DSCF. Values for total P2O5 fell between 0.00053 and 0.01065 gr/DSCF. Data will be used for establishing performance standards. Control equipment includes cyclones and scrubbers.

37664

APTIC NO. 61183

Schmidt, E.

BALANCE OF AIR POLLUTING FLUORINE FRACTIONS. (Bilanz luftverunreinigender Fluoranteile). Text in German. Bundesverband der Deut. Ziegellnd. Forsch., vol. 80:21-24, 1973.

On a brick kiln with a capacity of 3800 kg/hr and a fuel consumption of about 152 kg/hr, measurements of the sulfur dioxide and trioxide and of the fluorine emission were taken. The gas was sampled with a heated quartz tube which was followed by a filter filled with quartz wool for separation of those fractions bound to dust. For analysis of the fluorine concentration, the gas sample was led through a scrubber filled with 2n caustic soda. The samples thus obtained were filled into synthetic bottles for later analysis in the laboratory. The fluorine was determined by water vapor distillation and following colorimetry by the Belcher-West method. The emission of SO2 and SO3 was determined separately in an apparatus by Corbett where SO3 is first absorbed in isopropanol and SO2 next in iodine solution. The concentrations were determined by simple titration. The main measurements were taken over a period of 8 days. They were followed by measurements over 1 day after the furnace operation had been halted. The average concentration of the fluorine emission was 138 mg/cu m. The highest concentration measured was 201 mg F/cu m, the lowest 75 mg/cu m. The sum of SO2 plus SO3 was 328 mg/cu m, with SO3 constituting 71%. On the average, 59% of the fluorine entered with the crude material were driven off. The values fluctuated in dependence of the kiln operation.

37665

APTIC NO. 60505

Schwarzbach, E.

ON THE ENVIRONMENTAL HAZARDS OF UNBURNED LEAD ANTIKNOCKS. (Zur Frage der Umweltgefaehrung durch nicht verbrannte Blei-antiklopmitel). Text in German. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1117-1120, May 1973. 2 refs. (Oct. 2-6.)

AIR POLLUTION ABSTRACTS, AUGUST 1974

In discussions of environmental pollution by lead from vehicle exhaust gases, it is generally forgotten that at some points more danger is caused by the spread or evaporation of unburned antiknock Pb compounds. These extremely toxic compounds, the Pb alkyls tetramethyl lead and tetraethyl lead, are present in amounts of approximately 0.5 to 0.6 g/l of fuel. Because of their relatively high stability and volatility, they evaporate completely if the fuel is spilled, or partially from open containers, depending on the vapor pressure. (Author summary)

37666

APTIC NO. 60450

Ter Haar, G.

THE SOURCES AND PATHWAYS OF LEAD IN THE ENVIRONMENT. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 59-76, May 1973. 54 refs. (Oct. 2-6.)

Lead in the environment comes from the manufacture of storage batteries and other metal products, gasoline antiknock use, paint pigments, and other uses. Particulate Pb is removed from the atmosphere by sedimentation, rainfall, and snowfall. Soil and sediments are the ultimate sinks for Pb in the environment. The major source of Pb in man is the food chain. Plants and ultimately man receive most of their Pb from that naturally present in soil. Lead in air, even near major highways, does not add measurably to the Pb content of the edible portion of most crops. However, leafy portions of plants near busy highways contain higher concentrations of Pb. A several-fold increase in Pb in soil does not measurably increase the concentration of Pb in plants. The contribution of Pb from automobile exhaust to the food chain is minimal and is not increasing. Experiments supporting these views are reviewed. (Author summary modified)

37667

APTIC NO. 61234

Toyonaga, H.

SOOT FORMATION TENDENCY OF HYDROCARBONS CONTAINED IN TOWN GAS. (Toshigas-chu no tankasuisorui no susu seisei keiko). Text in Japanese. Preprint, Combustion Inst. (Japan), p. 147-148, 1973. (Presented at the Symposium on Combustion, 11th, Tokyo, Japan, Dec. 6-7, 1973, Paper 40.)

The formation of soot in town gas is due to a small amount of C2-C5 hydrocarbons contained in the gas. Soot formation was examined to establish the soot formation tendency of hydrocarbons by which the soot forming tendency of town gases can be computed according to their composition and used as a quality control index. Soot was formed on the surface of a water-cooled glass plate using a diffusion flame 15 cm long. The distance between the nozzle and the glass plate was varied from 7.5, 9.0, 10.5, to 12.0 cm. Ethylene, propane, propylene, butane, butylene, pentane, hexane, cyclohexene and benzene were examined and the soot formation coefficient was developed for each hydrocarbon taking propane as a standard. When the amount of soot formed was plotted against the summation of the product of volume fraction of each hydrocarbon times its soot formation coefficient, a simple curve was obtained. The amount of soot formed was a function of the distance of the nozzle and the glass plate and the distance of the maximum soot formation was different for each hydrocarbon.

37668

APTIC NO. 60840

Vatavuk, William M.

SUPPLEMENT NO. 1 FOR COMPILATION OF AIR POLLUTANT EMISSION FACTORS. SECOND EDITION. 4.3 STORAGE OF PETROLEUM PRODUCTS, 4.4 MARKETING AND TRANSPORTATION OF PETROLEUM PRODUCTS. Office and Air and Water Programs,

EMISSION SOURCES

Research Triangle Park, N. C., Office of Air Quality Planning and Standards. AP-42, 28p., July 1973. 13 refs.

NTIS: PB 231170/AS

Sources of emissions from petroleum products in storage and from marketing and transportation are described. There are six sources of emissions from petroleum in storage. Breathing losses are associated with fixed roof tanks and consist of vapor expelled from the tank. Working losses consist of hydrocarbon vapor expelled from the vessel as a result of emptying or filling operations. Filling losses represent the amount of vapor that is vented to the atmosphere through displacement. Standing storage losses result from the improper fit of the seal and shoe to the tank shell. Wetting losses with floating roof vessels occur when a wetted tank wall is exposed to the atmosphere. Boiling loss is the vapor expelled when the temperature of the liquid in the tank reaches its boiling point and begins to vaporize. Losses from marketing and transportation fall into five categories, depending on the storage equipment or mode of conveyance used: large storage tanks, railroad tank cars and tank trucks; marine vessels; service stations; and motor vehicle tanks.

37669

APTIC NO. 61124

Williams, Richard D. and Gregory A. Lorton

THE AUTOGENOUS HYDROGEN AUTOMOBILE. J. Environ. Syst., 3(4): 267-275, Winter 1973. 10 refs.

Results of the first phase of a feasibility study for the incorporation of a catalytic steam reforming reactor into the power plant system of a hydrogen automobile are presented. Improvement in emission characteristics, particularly for nitrogen oxides, with the use of hydrogen is due primarily to the lower flame temperature resulting from lean combustion and to the high rate of combustion of hydrogen resulting in decreased residence time necessary in the flame zone for obtaining complete combustion. Two laboratory prototype reformers are used to steam reform hexane feedstock to fuel gas mixtures consisting of hydrogen, methane, carbon monoxide, and carbon dioxide; the reactors are filled with Girdler 5/8-inch raschig ring nickel reforming catalyst. Reactor residence times near .01 sec allow complete conversion of hexane to theoretically predicted equilibrium product distributions. Experimental steam-to-hydrogen composition in the fuel gas generated at 2.5 atm with a carbon ratio of 2.56 ranges from .38 to .68 mole% (dry basis) at temperatures of 485 and 695 C, respectively. The equivalent reactor volume required to provide fuel gas at a rate sufficient to power a medium-sized car at 60 mph is estimated to be on the order of 0.2 cu ft. Conversion above 485 C is found to be thermodynamically rather than kinetically controlled. (Author abstract modified)

37670

APTIC NO. 61446

Yamada, Takeshi

FUEL AND COMBUSTION CONTROL CONCERNING REDUCTION OF NITROGEN OXIDES. (NOx teigen ni kansuru nenryo oyobi nensho kanri). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 1-8, 1973. (Presented at the Japan Petroleum Institute, Lecture Meeting on NOx Reduction, Tokyo, Japan, Aug. 29-30, 1973.)

The mechanism of nitrogen oxide formation is described. The effects of fuel, temperature, and oxygen on NOx formation are reviewed. The formation of nitric oxide increases with higher temperature and increased O2. The combustion reaction reaches equilibrium before NO forms; therefore, the NO formation takes place only in the rear half of the flames. Nitrogen dioxide is produced by the oxidation of NO. The formation mechanism of NO2 is discussed in relation to the equilibrium constant of the formation reaction and equilibrium concentration of NO. Nitrogen dioxide usually amounts to 5-10% of the NO formed, which is greater than expected by theoretical analysis. This may be due to inaccuracy of measurement methods.

37673

APTIC NO. 12053

37671

Engineering-Science, Inc., McLean, Va.

SAN DIEGO GAS AND ELECTRIC COMPANY, KEARNY MESA GAS TURBINES, SAN DIEGO, CALIFORNIA. Office of Air Programs Contract 68-02-0225, Task 14, Rept. 73-TRB-2, 35p., March 1973. 1 ref.

Source emission tests were conducted on the exhaust gases from two gas turbine power generators of the San Diego Gas and Electric Co. The tests were conducted to aid in the establishment of federal emission standards for sources in this category. The units tested were equipped with a water injection system designed to reduce oxides of nitrogen emissions. Continuous samples were taken for the determination of hydrocarbons, oxygen, carbon monoxide, and NOx by flame ionization detector, polarographic and paramagnetic sensors and infrared spectrometry. In addition, NOx was also measured using grab samples. All samples were taken from the turbine exit stack according to the recommended source test procedures of the Office of Air Programs. Some modifications of standard procedures were necessary due to the unique characteristics of these facilities. This test was also of an experimental nature in that extensive comparison of test methods was conducted. Hydrocarbon results were uniformly low with most values less than 1 ppm at normal operating loads. As the load dropped, the HC content increased, reaching a maximum steady state value of approximately 10 ppm at the 5 Mw load. Carbon monoxide values, like the HC concentrations, were low and reasonably constant from point to point and from test to test. Values ranged from 20 ppm to 38 ppm for the normal load tests. At low load levels CO concentration increased, reaching 235 ppm at the 5 Mw load. The various methods of determining NOx concentration did not yield identical values, but did show the NOx concentration to be uniform throughout the stack and relatively constant with time. The NOx concentration varied in direct proportion with the load—approximately 60 ppm at 18 Mw and approximately 30 ppm at 5 Mw with no water injection. The PDS method for NOx yields the highest values but results are frequently erratic. Electrochemical and chemiluminescence methods yield results that are nearly identical and are very stable. Lead dioxide yields the lowest values with somewhat more variability than the continuous analyzers but not as much variability as the PDS.

37672

APTIC NO. 59170

California State Air Resources Board

SUMMARY OF NEW VEHICLE AND ENGINE APPROVALS - 1973 MODEL YEAR. Preprint, 31p., Jan. 17, 1973.

Data for hydrocarbon, carbon monoxide, and nitrogen oxide projected exhaust emissions for light duty, gasoline powered vehicles at 50,000 mi, for heavy-duty, gasoline-powered vehicles at 1500 test hours time, and for heavy-duty, diesel-powered engines after a minimum of 50 hr of dynamometer testing are listed for those 1973 model year vehicles and engines approved for sale in California by the Air Resource Board as of January 2, 1973. Each applicant was required to run a durability data test fleet to verify performance, and the appropriate deterioration factors were then applied to the exhaust emission test values for each emission data vehicle or engine to obtain the projected exhaust emission values.

37673

APTIC NO. 60585

Groupeement d Interet Economique, Paris (France)

PLASTIC PACKAGING MATERIALS AND THE PACKAGING OF LIQUID FOOD PRODUCTS. (Les emballages plastiques et le conditionnement des liquides alimentaires). Text in French. Enviplast, 19p., 1973 (7). 6 refs.

Problems of the use of plastic packaging materials for liquid food products, and of their disposal from an environmental point of view, are discussed. The percentage of plastic packaging materials increased from 3% in 1965 to 7% in 1970, and a

further increase to 10% is expected for 1975. The shares of polyolefins, polyvinyl chloride (PVC), polystyrene, and other plastic materials within the entire plastic material production in France in 1972 were 61%, 20%, 14%, and 5%, respectively. The corresponding predictions for 1975 are 60%, 21%, 14%, and 5%. Due to their high calorific value, plastic wastes have beneficial effect on the combustion process in waste incinerators, especially in such combined with waste heat recovery units. All plastic wastes except PVC form carbon dioxide and water vapor upon incineration, while PVC forms hydrochloric acid mist but no chlorine. Although the HCl quantities thus emitted by incinerators are negligible, they can be easily neutralized in the flue gases.

1972

37674

APTIC NO. 58801

Andreoni, Diego

TECHNICAL PREVENTION OF ASBESTOSIS IN THE USE OF ASBESTOS AND ASBESTOS CONTAINING PRODUCTS. (Prevenzione tecnica dell'asbestosi nell'impiego dell'amianto e dei prodotti contenenti amianto). Text in Italian. Securitas (Rome), 57(8-9):753-776, 1972.

General problems of the hazards involved in the use of asbestos and asbestos-containing products, the fields of use of asbestos, the chemical and physical properties of different kinds of asbestos, and a method for the determination of asbestos fibers in the atmosphere of workplaces are described. Substitution of asbestos and asbestos-containing products by other materials free from asbestos and effective exhaust in workplaces are among the basic possibilities for reducing asbestosis hazards. Personal protective devices should be worn in workplaces where the asbestos fiber concentration in the air exceeds 2 fibers per cu cm. A standard method for the sampling and determination of in-the-air asbestos fiber concentrations envisages the use of personal air samplers with diaphragm pumps, providing for a sampling rate of 1.8 l/min at a flow rate of 15 cm/sec. The filter used in the personal air sampler can be humidified with chloroform solution of Perspex. The fiber samples are then transferred into a glycerine triacetate solution for microscopic counting. Phase contrast microscopic counting is especially suitable for the counting of asbestos fibers in mixed dusts.

37675

APTIC NO. 60615

Burgess, Ray W., Jr.

AN INVESTIGATION OF THE DETECTION OF CHARGED METAL PARTICLES IN A JET ENGINE EXHAUST BY A CYLINDRICAL ELECTROSTATIC PROBE. Air Force Inst. of Tech., Wright-Patterson AFB, Ohio, Rept. GEP/PH/72-2, 75p., June 1972. 13 refs.

NTIS, DDC: AD 745540

Charged particle detection by an electrostatic probe in a jet engine was studied from both a theoretical and an experimental approach. The charging mechanisms for a metal particle in a jet engine exhaust are presented and discussed. A theory for the waveshape expected for a charged metal particle moving perpendicularly to a cylindrical electrostatic probe is developed using an electronic circuit equivalent to the physical mechanisms in the jet engine. A laboratory burner is described which simulates the exhaust ion number density and lower thrust values of a jet engine. Experimental data are presented for the burner and for a scaled up system which uses a 0.44 cm diameter particle, a 7.6 cm diameter probe, and a 30 cm/sec velocity. The theory predicts a bipolar current spike for a particle missing the probe and a monopolar spike for a particle that hits the probe. The scaled up system produces current spikes predicted by the theory, but the burner experiment does not. The reason for the unpredicted spikes is the lack of particle charging due to the absence of spray charging in the burner. This shows that spray charging is a very significant

AIR POLLUTION ABSTRACTS, AUGUST 1974

cant charging mechanism in jet engines. The burner experiment also shows that there is a linear relationship between the logarithm of the exhaust number density and the fuel/air ratio for the burner. (Author abstract)

37676

APTIC NO. 60724

Finsterwalder, Gerhard

A NEW DEUTZ MULTIFUEL SYSTEM. Preprint, Society of Automotive Engineers, New York, 13p., 1972. 9 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972, Paper 720103.)

A new multifuel diesel engine system (Deutz FL 413 Series) has been designed to operate efficiently and is knock-free with all fuels available at gasoline stations. A series engine is supplemented with a high-tension ignition system employing a special spark plug in the direct vicinity of the injection nozzle; the spark plug can be subsequently installed following the rework of standard parts. Examination of the smoke value over that part of the injection period prior to the commencement of combustion reveals that the formation of soot is reduced accordingly if the fuel is injected before the beginning of combustion, thus preventing the liquid fuel from coming into contact with the flames.

37677

APTIC NO. 60851

Foster, J. F., C. W. Melton, R. I. Mitchell, and D. A. Trayer

CHEMICAL AND PHYSICAL CHARACTERIZATION OF AUTOMOTIVE EXHAUST PARTICULATE MATTER IN THE ATMOSPHERE. FINAL REPORT. Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Proj. CAPE-19-70, Rept. CRC-APRAC-CAPE-19-70-1, 75p., Oct. 6, 1972. 60 refs.

NTIS: PB-213 593

A dilution tunnel was constructed for diluting automobile exhaust to an average dilution ratio of approximately 25:1 to 100:1. The system has been used in experiments with two automobiles. One tenth percent fractions of diluted exhaust were sampled on cascade impactors to obtain particle size classification above 0.25 micron. Total particulate emission was obtained by filtration. Particles were studied for morphology, chemical composition, and association with polynuclear aromatic hydrocarbons. The light scattering property of the freshly generated and diluted aerosol was measured. Impacted particles emitted from a 1967 car without emission controls, operated on commercial gasoline with 2.16 g lead/gal, were found to be agglomerates of smaller particles. Individual particles showed electron-opaque cores surrounded by electron-transparent shells. The core is probably a Pb salt, and the shell probably carbonaceous matter. Particles emitted from a new 1970 engine in a new 1970 car with engine modification-type exhaust emission controls and operated on gasoline with 0.1 g Pb/gal were also agglomerates of smaller particles. However, the cores of these particles were rather transparent to the electron microscope beam. The particles resembled soot. Several methods for measuring benzo(a)pyrene (BaP) and other polynuclear aromatic hydrocarbons associated with small quantities of exhaust particulate were investigated. A minimum of one nanogram BaP was measurable with a Turner Model 210 spectrofluorometer. High pressure liquid chromatography using oxypropionitrile on Porasil C in a microcolumn gave separation of polynuclear aromatic hydrocarbons. The combination permitted measurement of 0.02 microgram BaP. The BaP was associated only with exhaust particles in the smallest size fraction. These particles also contained lesser amounts of metallic elements than particles collected from the same exhaust in the larger size fractions. This implies that most of the smallest size fraction was organic, and that BaP is primarily associated with organic particles. (Author summary modified)

37678

APTIC NO. 60874

Fraize, W. E.

U. S. TRANSPORTATION--SOME ENERGY AND ENVIRONMENTAL CONSIDERATIONS. MITRE Corp., McLean, Va., Rept. MITRE 72-164, 43p., Sept 1972. 34 refs.

NTIS: PB 213 034

The role of transportation in air pollution and consumption of energy, especially petroleum, is reviewed, with emphasis on the U. S. situation. Both technological and control measures for each problem area are discussed. Technological measures focus on the automobile, high speed ground transportation modes, and non-petroleum fuels, while control measures, which encourage the use of the more efficient transportation modes, offer significant benefits. The near future is discussed with respect to the impact of the U. S. Amended Clean Air Act of 1970. Transportation evolution over the next few decades is projected. Replacement of the modified spark ignition engine with an inherently clean alternative and the use of gas turbines in inter-city trucks and buses will both serve the cause of pollution reduction. Several changes which do not involve an energy saving but benefit petroleum conservation and cleaner air are: electrification of rail systems, urban autos, and mass transit; use of non-petroleum fuels (especially hydrogen); and use of gaseous fuels. Those transportation shifts which favor cleaner air and reduced consumption of energy and petroleum most worth striving for are: growing use of smaller, less powerful automobiles; increased use of urban mass transit and improved high speed ground systems; the use of H₂ fuel cells for intercity/rural auto use. (Author abstract modified)

37679

APTIC NO. 61433

Fukazawa, Masakazu, Tadashi Murayama, Kenichi Ito, and Shuichi Kajitani

STUDIES ON THE MECHANISM OF FORMATION OF AIR POLLUTION SUBSTANCES DISCHARGED FROM SMALL GASOLINE ENGINES AND THEIR ELIMINATION. (Kogata gasolin kikan ni okeru taiki osen busshitsu no seisei kiko to sono jokyo ni kansuru kenkyu). Text in Japanese. Nippon Jidosha Kenkyujo Kenkyu Sokuho (Res. Lett. Japan Automob. Inst.), no. 10:125-138, Sept. 1972. 1 ref.

A single cylinder engine was investigated. Regular gasoline was used to drive this air-cooled 4-process engine. The specific weight of this gasoline was 0.744 at 15 C. The elemental composition was 0.856 carbon, 0.143 hydrogen, and 0.001 sulfur. Addition of methanol to this gasoline reduced the content of carbon monoxide and hydrocarbons in the discharged gas. The content of NO_x increased by the addition of CH₃OH. Although the calorific value of the fuel decreased by the addition of CH₃OH, the fuel consumption did not increase because the engine could be operated at a larger air mixing ratio. The addition of hydrogen to the intake air increased the carbon monoxide concentration in the discharged gas except when the air was added in excess. The same tendency was found with hydrocarbons. The addition of up to 1% hydrogen did not affect the nitric oxide content in the discharged gas, but the addition more than 1% hydrogen caused the NO content to decrease. This effect is especially large when more air is added to the fuel. Studies were also made on the variation of the air-fuel ratio in the gases supplied to each cylinder in a multi-cylinder gasoline engine equipped with a single evaporator. Chemical analyses were made of the gas supplied to and discharged from each cylinder.

37680

APTIC NO. 60816

Gaskill, James R.

HOW PLASTICS SMOKE. Soc. Plastics Engrs. J., 28(10):43-49, Oct. 1972. 5 refs.

A laboratory study was made of smoke density in a smoke chamber. The smoke emanating from burning plastics was

measured by a photoelectric cell. Light transmission values were transformed into specific optical densities. A value of 50 smoke density was considered a moderately dense smoke; one of 100-300 was dense; greater than 400 was very dense. A smoke obscuration index of 5-10 was of little hazard to visibility; of 10-30 was probably hazardous; and in excess of 30 was definitely hazardous. Seventy-five different materials were tested for smoke generation including red oak, acrylics, ventilated and nonventilated plastics, polymethylene polyphenyl isocyanate, foams, nylon, polycarbonates, elastomers, and polytetrafluorethylene. A Materials Smoke Obscuration Index (MSOI) was proposed, and a means for seeking out a Materials Smoke Toxicity Index MSTI was suggested. The gaseous components of smokes were also measured. The plastics showed a broad spectrum of smoking characteristics. When exposed to heat alone, many plastics smoked like wood, i.e., slowly building up to a high density. Certain ones rapidly evolved dense smokes; a few did not smoke. In the presence of heat and flame, however, two separate phenomena were observed: plastics that tended to burn cleanly simulated the characteristics of wood under similar conditions; those that did not burn cleanly, i.e., were fire retardant, rapidly evolved dense to very dense smokes that were not easily cleared away by ventilation. The presence of filters may complicate the picture. Small, inert airborne particles will also obscure light, and hence vision. Unless a materials system, its thicknesses, and compositions are tested, smoke analyses may be misleading.

37681

APTIC NO. 10196

Gonzalez, C. C. and R. N. Allen

CHROMIUM MINING AND SMELTING CORPORATION, MEMPHIS, TENNESSEE. TRW Inc., McLean, Va., Resources Research, Inc., Environmental Protection Agency Contract CPA 70-81, Rept. 72-PC-05, FA-6, SN 16544.009, 86p., June 1972. 1 ref.

Source emission tests were conducted during the week of Feb. 1, 1972 at the Chromium Mining and Smelting Corp.'s furnace No. 21 which produces silico-manganese at the Memphis, Tenn. plant. The unit was completely hooded, and exhaust gases were directed to a newly designed wet scrubber. The overall survey included six particulate emission runs, six Orsat measurements, and particle size analyses. The total particulate at the scrubber outlet averaged 0.0856 g/SCF which is equivalent to 11.57 lb/hr. The total particulate at the scrubber inlet duct averaged 1.65 g/SCF which is equivalent to 230.0 lb/hr. The average particulate removal efficiency was 94.5%.

37682

APTIC NO. 60722

Iya, K. Sridhar

REDUCE NO_x IN STACK GASSES. Hydrocarbon Process., 51(11):163-164, Nov. 1972. 4 refs.

The kinetics of nitrogen oxides formation, NO_x emission factors, and methods for the control of NO_x are briefly outlined in relation to the hydrocarbon processing industry. Factors influencing NO_x formation in a combustion system are: type and composition of fuel, rates of heat release and heat loss, amount of excess combustion air, and mixing and distribution of fuel/air in the combustion chamber. Important techniques for reducing NO_x emission are flue gas recirculation, low excess air firing, water or steam injection, two-stage combustion, and combinations of these. Catalytic reduction is a useful alternative control method; catalyst life is limited by the temperature to which the catalyst is exposed and the oxidizing tendency of the flue gas. The technique combines advantages of low pressure drop, good distribution of gas to catalyst surface, thermal stability, and high volumetric efficiency.

37683

APTIC NO. 60836

Kubant, Josef

A COMPLEX MATHEMATICAL-STATISTICAL EVALUATION OF THE COMPOSITION AND PROPERTIES OF COAL. (Komplezni matematicko-statistické

hodnoceni slozeni a vlastnosti uhli). Text in Czech. In: Sbornik Prednasek. Bechovice, Czechoslovakia, Ustavu pro Vyzkum a Využití Paliv, 1972, p. 11-25.

The conventional method of expressing the analytical results of a coal in % of the combustibles is based on a fictitious combustible content. This does not account for the ash factor, the water of hydration in the ash matter, and the heat effect of the ash matter during its combustion. A new method is proposed, based on a mathematical-statistical evaluation of the relationship between the ash content and the other qualitative parameters. The maximum ash content is calculated from a determination of the organic carbon content of the specimen. Curves showing the effects of the ash content on the carbon content, on the total hydrogen and on the organically-bound hydrogen, on the oxygen content, and on the heat of combustion indicate a linear relationship.

37684

APTIC NO. 60925

Peters, David W.

SOURCE EMISSIONS SAMPLING AND RADIATION SURVEY OF PLASMA TORCH, MC CLELLAN AIR FORCE BASE, CALIFORNIA. FINAL REPORT. McClellan AFB, Calif., Environmental Health Lab., Proj. AAF-126, Rept. 72M-13, 16p., July 1972. 2 refs.

NTIS, DDC: AD-752 020

The procedure used and the results obtained from sampling the emissions from a plasma torch cutting operation for stainless steel and aluminum are described. The emissions were sampled from the stack used to direct the exhaust system air away from adjacent buildings. The exhausted air was sampled for particulate matter, nitrogen oxides and ozone. An octave band analysis of the noise exposure to the operator was performed. The exhaust from the ventilation system has concentrations of nitrogen oxides, ozone and metal oxide fumes which are above the recommended threshold limit values for these compounds. Since no personnel are directly exposed to the exhaust emissions, threshold limit values do not give a good indication of the potential exposure hazards. The emissions from the torch exhaust system appear to be sufficiently diluted before contacting any personnel working in adjacent areas. This observation was based on visual inspection of the particulate dispersion as the exhaust entered the surrounding area. An accurate check of this could only be made with an ambient air study of the area suspected of contamination. The noise level in the operator's area, while the torch is operating, requires the use of earplugs or ear muffs. Results of the radiation study will be presented elsewhere.

37685

APTIC NO. 55031

Powell, R. A.

THE GROWTH OF AN IRON ORE DUST PROBLEM - PORT HEDLAND, WESTERN AUSTRALIA. Clean Air Society of Australia and New Zealand, Proc. Int. Clean Air Conf., Melbourne, Australia, 1972, p. 146-151. 1 ref. (May 15-18.)

An iron ore dust testing program in Port Hedland, Australia, a town situated nearby an iron ore port and having a dry and windy climate, has demonstrated that when dealing with wind blown dust of particulate size ranging in the order of 10 to 20 micron the open-top type of deposit gauge is unreliable since dust has little chance to settle in it. The CERL directional dust gauge, with its vertical slot, intended to simulate an open window, has proved to be completely suitable for this type of investigation. Investigation of control methods in the area has revealed that salt water can substantially reduce wind erosion and subsequent dust emission. The brine has a crusting effect which binds the surface layer of iron ore stockpiles. The proportion of salt water added to the iron ore does not appear to interfere with the subsequent refining process.

26

37686

APTIC NO. 56733

Shieh, Wen-Shong and Robert H. Essenhigh

COMBUSTION OF COMPUTER CARDS IN A CONTINUOUS TEST INCINERATOR: A COMPARISON OF THEORY AND EXPERIMENT. American Society of Mechanical Engineers, New York, Proc. Natl. Incinerator Conf., New York, 1972, p. 120-134. 24 refs. (June 4-7.)

A mathematical model predicting the rate of combustion in a test incinerator has been compared with previous experiments on a zonal basis. Predictions of rise in temperature in the solid bed from the grate upwards bracketed the experimental data obtained on eight runs, and agreement between predicted and experimental values of the combustion zone depth and maximum temperature was good. Prediction of the pyrolysis zone depth was less satisfactory but not unrealistic. Rate equations for a stirred reactor sub-zone in the overbed zone were tested by Arrhenius plots and yielded an operational activation energy for the volatiles burn-up of 20.1 kcal and frequency factors that changed with the quantity of overfire air. These derived kinetic data were then used in a computer program to predict the rate of burn-out in the final plug-flow sub-zone with comparisons of the oxygen decline for testing the predictions. Agreement was good, and the program predicting the oxygen decline also predicted overall completeness of combustion. Total burn-out inside the test incinerator was obtained for six of eight runs when excess air was greater than 14%. Only 90% combustion within the unit at zero excess air was predicted which agreed with a response from a smoke meter in the stack for the run. The program appears to be potentially capable of predicting the onset of smoke emissions. (Author summary modified)

37687

APTIC NO. 60891

Sorenson, Spencer C., J. J. Stukel, and W. L. Hull

PREDICTION OF EXHAUST EMISSIONS FROM PRIME MOVERS AND SMALL HEATING PLANT FURNACES. (FINAL REPORT). Illinois Univ., Urbana, Dept. of Mechanical and Industrial Engineering, Army Contract DACA 23-70-C-0080, Proj. 21 02020 08-7035 P2270.4-251 S11-205 07670101, Tech. Rept. E-1, 110p., July 1972. 202 refs.

NTIS, DDC: AD 749457

Results of a literature survey concerning the possibilities of predicting the exhaust emissions from various types of prime movers (spark ignition, compression ignition, and gas turbine engines) and small heating plant furnaces are presented. Carbon monoxide and oxides of nitrogen correlate reasonably well with basic engine operating parameters for spark ignition and compression ignition types, while hydrocarbon emissions from these engines do not. Smoke emissions from compression ignition engines also do not correlate with engine variables. Gas turbine emission correlation attempts were unsuccessful due to some extent to the lack of meaningful data to accompany emissions data. Carbon monoxide emissions from fossil fuel-burning installations appear insignificant if proper firing conditions are maintained, and the amount of sulfur oxides emitted to the atmosphere appear completely dependent on the amount of sulfur contained in the fuel. Average oxides of nitrogen emission from a typical fossil-fuel burning installation appear predictable, though emissions from a particular furnace do not appear capable of estimation with any degree of accuracy. Average particulate emissions from a typical coal-burning installation can also be predicted, though a quantitative estimate of the effect of operating variables on particulate emission from coal- or oil-burning furnaces is not possible. Hydrocarbon emissions from fossil fuel-burning installations cannot be predicted.

37688

APTIC NO. 60973

Ulmer, Georges

STUDY OF POLLUTANT EMISSIONS FROM INDIVIDUAL HEATING EQUIPMENT. (Etude des émissions de polluants par les appareils de chauffage individuel). Text in French. Fonderie (Paris), no. 309:49-54, Feb. 1972.

Pollutant emissions generated by individual heating equipment with capacities of up to 50 thermal units/hr, fired with solid fuel and domestic heating oil, were studied. With proper burner adjustment, the particulate emission from fuel oil-fired heating equipment was very low, exceeding 0.1 g/kg rather infrequently. It was also fairly low for solid fuels with low volatile matter content, such as lean coal and degassed ovoids. The sulfur dioxide emissions were principally determined by the fuel sulfur content, and consequently they were lowest for fuel oil. The nitrogen oxides emission was very low with 1.5-60 ppm due to the low combustion temperature.

37689

APTIC NO. 03641

Vervaeert, Alfred E.

MALODOROUS REDUCED SULFUR EMISSIONS FROM INCINERATION OF NON-CONDENSABLE OFF-GASES. WESTVACO KRAFT MILL, WICKLIFFE, KENTUCKY. Office of Air Programs, Research Triangle Park, N. C., Emission Testing Branch and Environmental Engineering, Inc., Gainesville, Fla., Office of Air Programs Contract, Rept. 73-KPM-1A, 107p., 1972. 6 refs.

An emission source test was conducted at the Westvaco kraft mill in Wickliffe, Kentucky in order to gather emission data which would demonstrate the emission limitations attainable, through the use of incineration, for the control of odorous reduced sulfur emissions from digester and evaporator effluents in order to set performance standards. The operation tested was a natural gas-fired incinerator used to combust non-condensable off-gases emitted from digester and multiple-effect evaporator vents. Total reduced sulfur values in lb/hr ranged from 0.18-1.48 at the incinerator outlet; those at the inlet varied between 32.20 and 625. Daily average sulfur dioxide emissions at the incinerator outlet ranged from 9.42-358 lb/hr; those at the inlet varied between 0.79-5.77 lb/hr. Daily average concentrations of the component gaseous sulfur compounds were also measured and recorded, and a tabular summary was constructed for supplementary flow rate, moisture, temperature, and Orsat determinations. Measurements made through the SO₂ scrubber resulted in certain biases due to unsteady equilibrium conditions. Negative bias was assumed for the most part to be introduced as a result of sample losses in the scrubbing solution; although not quantified, these losses in all likelihood did not exceed 20% in the 0 to 1 ppm TRS range. Tailing of the SO₂ peak as a result of SO₂ saturation of the gas chromatograph/flame photometric detector used to resolve the low-molecular weight sulfur compounds made it impossible at times to monitor compounds eluting after SO₂.

37690

APTIC NO. 60884

Wiackowski, S. K.

THE PROBLEM OF INDUSTRIAL EMISSIONS AND THEIR INFLUENCE ON SYLVAN CENOSSES AND HUMAN HEALTH. (Problem emisji przemysłowych i ich wpływ na biocenozę lasne i zdrowie człowieka). Text in Polish. Preprint, 13p., 1972 (7). 10 refs.

The effects of air pollution in Polish industrial regions of sylvan vegetation, agriculture, and population, are compared to world statistics. The main sources of pollution in Poland are: steel works; cement, coal, and chemical industries; and motor vehicles. Approximately 5,000,000 tons of dusts/yr and 3,000,000 tons sulfur dioxide are emitted in Poland. The highest pollution level is encountered in the Silesian Cracowian Industrial Region, new industrial units are developed, obsolete units are maintained, and household and industrial heat-

ing are based on ovens using coal with a high sulfur content. The dust quantity in the Katowice Region reaches an average of 726,000 ton/yr. Two-thirds of the patients with circulatory, respiratory, kidney, rheumatic, and cancer diseases come from mining regions. Industrial pollution is most hazardous in winter due to increasing emissions by heating and significant decrease in the filtration of pollutants by vegetation. Smogs are the most hazardous. The Silesian Cracowian Basin is situated between the Carpathians and the Cracow Czeszochowa Jura and additional pollutants are brought from the Karwin Ostrowa Basin by winds. Three million cars are another serious pollutant. Accumulation of copper, lead, zinc, and arsenic concentrations in the soil leads to plant damage. Parasitic insects thrive in industrial sylvan terrains. Large economic losses due to crop failure and forest damages are suffered. Reforestation and emission controls are indicated.

37691

APTIC NO. 08785

Weston (Roy F.), Co.

EMISSIONS FROM DRY PROCESS CEMENT KILN AT DRAGON CEMENT COMPANY, NORTHAMPTON, PENNSYLVANIA. (FINAL REPORT). Office of Air Programs Contract CPA 70-132, Task 1, Rept. 71-MM-05, 47p., March 27, 1972. 1 ref.

An Office of Air Programs emission test conducted by the Roy F. Weston, Inc. is reported for the No. 1 and No. 2 kilns at the Dragon Cement Company located in Northampton, Pennsylvania. Sampling results demonstrated that the outlet particulate concentrations from the kilns were low. Baghouse dust collectors controlled the emissions from each kiln. Particulate concentrations ranged from 0.00592-0.00954 gr/scf (taking into account only the particulates caught in the probe, cyclone, and filter of the sampling train). Particulates emitted per ton of feed to the kilns ranged from 0.0553-0.0942 (probe, cyclone, and filter). Sampling for nitrogen oxides, sulfur dioxide, gaseous mercury, carbon monoxide, carbon dioxide, and oxygen was also performed. Nitrogen oxides and SO₂ concentrations ranged from 94-419 ppm and from 295-650 ppm, respectively. The concentration of gaseous Hg was of the order of 0.0001 ppm by volume. Percent excess air ranged between 322% and 466%. (Author summary modified)

37692

APTIC NO. 60446

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

DISTURBED ENVIRONMENT-PROBLEM NO. 1. (Gestoerte Umwelt-das Problem Nr. 1). Text in German. In: Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980. P. 7-11, 1972.

General problems of air pollution, water pollution, noise pollution, and waste disposal in North Rhine-Westphalia are outlined. While environmental concerns had been largely neglected, solutions to this problem are available, though at the expense of considerable efforts. Increased industrial production, electricity generation, and traffic have resulted in an alarming increase in air pollution in West Germany in general, and in North Rhine Westphalia in particular. Smog, sulfur dioxide, hydrocarbons, nitrogen oxides, carbon monoxide, and lead compounds are the principal air pollutants. Air pollution, apart from affecting human and animal health, has afflicted serious damages to forests, and even to buildings and monuments made of stone, bronze, and glass. An inquiry conducted in the Ruhr industrial area among people who intended to move from that area revealed that 41% had complaints about the quality of air.

37693

APTIC NO. 60727

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

WASTE INCINERATION. (Müllverbrennung). Text in German. In: Reine Luft fuer morgen. Utopie oder Wirk-

klichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980. p. 55-60, 1972.

The state of the art and the expected evolution of the dust, sulfur dioxide, hydrochloric acid, and fluorine emissions from municipal waste incinerator plants in North Rhine-Westphalia are outlined. Dust emissions are expected to play a minor role in the total incinerator-generated emission in 1980 since the total dust emission presently amounts to some 500 tons/yr, and all waste incinerator plants are equipped with dust separators with a minimum efficiency of 95%. The emission of organic compounds can be effectively controlled by optimized combustion conditions. The PVC (polyvinyl chloride) content of domestic refuse, now well under 1%, expected to increase four-fold by 1980, would result in an enormous increase in the HCl emissions because fly ash and slag have reduced adsorption ability for HCl. The HCl emissions can be controlled by wet scrubbing processes, while dry adsorption is both inefficient and costly. The SO₂ emission would also increase rapidly. Slowdown of the increase in the SO₂, HCl, and F emissions is expected from the use of flue gas cleaning devices with a minimum efficiency of 80% for new plants from 1976 on. The introduction of such flue gas cleaning devices also for existing incinerators in 5 more years will result in a net decrease in the pollutant emissions.

37694

APTIC NO. 60728

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

NONFERROUS METALLURGY. (NE-Metallerzeugung). Text in German. In: *Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980.* p. 60-65, 1972.

State of the art and the expected evolution of the pollutant emissions from nonferrous metallurgical plants in North Rhine-Westphalia are outlined. Aluminum works cause local air pollution by the emission of gaseous fluorine, dust (alumina and fluorides), sulfur dioxide, and carbon monoxide. The specific fluorine, dust, and SO₂ emissions are 1.5-0.8 kg/ton, 20-9 kg/ton, and 15-3 kg/ton, respectively. Aluminum re-melting plants emit chloride aerosols, metal oxides, gaseous fluorine, and dust. The particulate emission is expected to fall from 1320 tons to 680 tons yearly in 1980, while the re-melting capacity will double. Lead melting plants emit mostly SO₂ and dusts containing zinc, cadmium, arsenic, bismuth, copper, and tin. The Pb and Zn emission will be drastically reduced by 1975. The Pb, Zn, and Cu emissions from Cu melting plants, already below 50 mg/cu m, are not expected to decline further, while the hydrochloric acid emission will be reduced by 50% by 1980. The SO₂ emission will increase from 900 tons in 1970 to 1100 tons in 1980. The SO₂ emission from Zn smelting plants will rise considerably until 1975, and further reduction in the SO₂ emission is expected from the introduction of the double-contact sulfuric acid production process and from flue gas desulfurization. The maximum allowable concentration of dusts containing toxic components in nonferrous metallurgical plants will be reduced from 150 mg/cu m to 50 mg/cu m.

37695

APTIC NO. 60729

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

STONE AND EARTH INDUSTRY. (Stein und Erden). Text in German. In: *Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980.* p. 65-66, 1972.

The state of the art and the expected evolution of emission in the stone and earth industry in North Rhine-Westphalia, as well as measures to be taken for pollution abatement in these industries are outlined. Dust, fluorine compounds, lead, zinc, barium, selenium, cadmium, boron, strontium and hexavalent chromium compounds, as well as combustion process-generated sulfur dioxide are the chief pollutants in the stone and earth industry. While measures taken a few years ago

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have resulted in a decrease in the dust emissions in cement works, the results achieved cannot be regarded as satisfactory. Step-up of cement production, and the trend toward larger production units will most probably result in a disproportionately great increase in the dust emissions due to labile operating conditions. Permanent control of the efficiency of dust-separating equipment, and automatic shutdown of clinker mills during periods of high emission rates in the cement industry, as well as the use of adequate apparatuses for the separation of F₂, Zn, Pb, and other volatile toxic compounds in the brick and glass industries, will be required for emission abatement.

37696

APTIC NO. 60730

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

COMBUSTION FLUE GASES FROM DOMESTIC HEATING AND TRADE. (Die Emittentengruppe Hausbrand und Kleingewerbe). Text in German. In: *Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980.* p. 67-72, 1972.

The state of the art and the expected evolution of emissions from heating equipment in households and trade, and of special emissions from small-scale industries in North Rhine-Westphalia are described. Carbon monoxide, sulfur dioxide, nitrogen oxides, hydrocarbons, including 3,4-benzo(a)pyrene, aldehydes, solvents, and other malodorous substances are the principal pollutants emitted by domestic heating equipment and trade. The increased use of fuel oil at the expense of coal, and of central and remote heating instead of individual heating units will result in a considerable decrease in the particulate and 3,4-benzo(a)pyrene emissions, while the SO₂ emissions will persist at the 1970 level until 1980 after which a steady decrease is expected. Further emission reduction by the use of natural gas is not possible in view to the limited supply. It is technically possible to reduce the fuel oil sulfur content to 0.3% by 1980. The increased use of fuels with reduced smoke emissions, fuel oil desulfurization, the propagation of central heating, and systematic inspection of heating equipment will be the basic possibilities of emission abatement in the domestic heating and trade area.

37697

APTIC NO. 60749

National Industrial Pollution Control Council, Washington, D. C., Utilities Sub-Council

THE NATURAL GAS INDUSTRY AND THE ENVIRONMENT. 19p., Aug. 1972. GPO

A brief report prepared by the Utilities Sub-Council of the National Industrial Pollution Control Council outlines in general fashion the profile of the gas industry, gas as an energy source and its environmental impact, extra-conventional uses of gas, research efforts concerning efficient uses of natural gas, the development of supplemental supplies of natural gas, and the nature and scope of the gas supply problem. The major limitation of natural gas as an energy source is its availability, not its environmental impact. Low-sulfur fuels, such as natural gas, are being relied upon more heavily as energy sources, with fuel oil and coal serving secondary or alternate roles depending upon the use of fuel clean-up technology. Compressed natural gas has been used for a number of years in a limited number of vehicles and is capable of reducing emissions up to 9%. Its use for powering vehicles, however, is expected to have a modest growth because of its range restriction and the lack of refueling stations. Torrax Systems, Inc., in conjunction with the Environmental Protection Agency, has entered into a demonstration project to test a new natural gas-fired incineration system for the disposal of municipal solid wastes. Particulate emissions from the incinerator are controlled through a fabric filter, and the emission control sub-systems operate without direct use of water, thus avoiding secondary pollution problems. Research is also ongoing in novel heat transfer

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techniques for more efficient use of gas and in the development of coal gasification and synthetic gas processes.

37698

APTIC NO. 60804

CLM Systems Inc., Cambridge, Mass.

AIRPORTS AND THEIR ENVIRONMENT: A GUIDE TO ENVIRONMENTAL PLANNING (FINAL REPORT). Dept. of Transportation Contract DOT-OS-00059, Rept. DOT P 5600.1, 497p., Sept. 1972. 262 refs.

NTIS: PB-219957

Development of the material presented in this report involved a combination of selected airport case studies, a literature review, and intensive discussions and interviews with public and private agency representatives, to identify, elaborate upon, and describe methodologies for measuring relevant airport environmental factors. Environmental planning processes, aircraft noise, impacts on land use, air pollution, water pollution, hydrologic impacts, and ecological impacts are discussed. An appendix consisting of case studies, a comprehensive annotated bibliography, relevant legislation, and relevant agencies and organizations is included. Pollutants emitted by aircraft engines and their rates of emission during different components of flight are reviewed for different aircraft. Other pollution sources considered are aircraft fueling systems, ground service equipment, ground testing and maintenance of aircraft engines, motor vehicles leaving and entering the airport, the airport heating plant, fuel storage losses, and air pollution during construction. Meteorological and topical factors are discussed along with measurement methods and standards. Possible solutions to the problems presented include aircraft engine and fuel modifications, modification of ground operations including increased engine idle rpm, use of minimal engines for taxi, elimination of delays at gate and runway, discontinued use of equipment for transport of passengers between terminal and aircraft, towing of aircraft to eliminate taxi emissions, discontinuance of use of auxiliary power units, and controlled emptying of fuel drainage reservoirs, improved airport layout planning, and minimizing air pollution during construction. (Author abstract modified)

37699

APTIC NO. 60866

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

IRON AND STEEL INDUSTRY. (Eisen und Stahl). Text in German. In: *Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980.* p. 32-37, 1972.

State of the art and the expected evolution of the particulate, sulfur dioxide, fluoride, and metal oxide emissions from the different processes in the iron and steel industry in North Rhine-Westphalia are outlined. While the electric-arc furnace process, and especially the oxygen converter process, will acquire increased shares in total steel output, the share of the open-hearth furnace process will decrease, and Thomas steel will fade out completely by 1980. Ore dressing operations are responsible for considerable emissions of sulfur dioxide, fluorides, chlorides, and dusts containing lead, manganese, copper, antimony, and other metals. Blast-furnaces are responsible for dust, carbon monoxide, nitrogen oxides, sulfur dioxide, and hydrogen sulfide emissions. Dust separation at oxygen converters is done primarily by means of wet type dust separators and electrostatic precipitators. The dust concentration in the cleaned waste gases from tissue filters and electrostatic precipitators should be limited to 30-40 mg/N cu m and to 50 mg/N cu m, respectively. The considerable CO emissions could be modestly decreased by limiting the air-excess coefficient to 0.1. Electric-arc furnaces should be equipped with suction hoods and tissue filters. Also, fluoride-containing fluxes should be abandoned. The emissions from iron and steel works can be abated by the shutdown of obsolete works, by the use of improved techniques of gas collection and purification for new plants, by the combined removal of sulfur and F₂ from

agglomeration plant-generated waste gases, and by the introduction of total dedusting for steel works, including electric-arc furnaces. The maximum allowable dust concentrations should be determined as a function of their content of toxic components.

1971

37700

APTIC NO. 60673

Berg, Lowell A. van den

HAZARDS OF MERCURY. SOURCES, DISTRIBUTION, AND CONTROL. Environ. Res., vol. 4:26-31, 60-69, 1971. 131 refs.

Sources and control of mercury emissions in Sweden, particularly from industrial chlor-alkali plants, are reviewed along with water decontamination experiments and recommendations for control and research programs. The main sources of the metal in Sweden as well as in other industrial and agricultural countries are: chlor-alkali plants, industrial processes involving the use of mercurial catalysts, slimicides in the paper-pulp industry, seed treatment, fossil fuel burning, and natural occurrence from geological formations. Mercury discharge from chlor-alkali plants in Sweden for the year 1967 ranged from 51-85 g/ton of chlorine produced, about one-tenth that recorded in previous years. Methods that contributed to the reduction include: cooling of the hydrogen gas and returning the condensate to the decomposer; returning the condensate, obtained by cooling the chlorine gas, to the brine solution; separating the waste streams and using epoxy on concrete floors to prevent entrapment of the metal; treating wastes by means of ion exchange; and improving procedures for reactivating cell anodes. Control is also under way for the replacement of alkyl-mercurial pesticides with less toxic alkoxy-alkyl mercurial compounds and for finding nonmercurial seed-treating agents. Evaluation of the mercury discharge contribution to the atmosphere resulting from aeration of mercury containing wastes, incineration of solid wastes or sludges, and combustion of digester gases in waste treatment plants appears warranted.

37701

APTIC NO. 60581

Berthier, L.

PLASTIC MATERIALS AND THE ENVIRONMENT. MUNICIPAL WASTES. (Matières plastiques et environnement. Les ordures ménagères). Text in French. Syndicat Professionnel des Fabricants de Matières Plastiques et résines Synthétiques, Paris (France), Commission Feu et Environnement, 23p., Oct. 1971.

The environmental impact of the presence of plastic materials in municipal wastes, and related air pollution hazards from the incineration of plastic wastes, are described. Plastic materials, especially in the form of packaging materials, make up an ever-increasing part of the municipal wastes. Polyethylene, polystyrene, polypropylene, polyvinyl chloride (PVC), and other plastic materials make up some 4% of the total amount of municipal waste, while the share of PVC alone ranges from 0.8 to 1.2%. Upon incineration in the presence of excess air, as usually occurs in waste incinerators, polystyrene, polyethylene, and polypropylene generate only carbon dioxide and water vapor, while polyvinyl chloride gives rise also to hydrochloric acid, but never to either chlorine or phosgene. The HCl emissions generated by PVC are negligible due to the intense dilution of the flue gases occurring at high altitudes upon discharge from high stacks. Assuming a PVC content of 1% in municipal waste, the ground level concentration of HCl would be 0.2 mg/cu m, against a maximum allowable level of 1.4 mg/cu m. On the other hand, HCl is emitted also by materials other than PVC. Corrosion due to HCl can be abated by keeping the flue gas temperature between the dew point and 300 C.

37702

Berthier, L.

PLASTIC MATERIALS AND THE ENVIRONMENT. PLASTIC TRASH BAGS. (Matières plastiques et environnement. Les sacs en matière plastique pour la Collecte des ordures ménagères). Text in French. Commission Feu et Environnement, Paris (France), Syndicat professionnel des Fabricants de Matières Plastiques et résines Synthétiques, 14p., Oct. 1971.

The advantages of polyethylene trash bags and their environmental impacts especially regarding combustion in waste incinerator plants are discussed. During its incineration, polyethylene is decomposed into carbon monoxide and water, which are not air pollutants. The high calorific value of polyethylene may create problems which will be solved in the near future by the development of new incinerators that will be able to handle wastes with high calorific values.

37703

Ellis, L. E.

A STUDY OF ENVIRONMENTAL PROBLEMS IN WASTE MANAGEMENT. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 97-107. 29 refs. (May 2-15.)

The history of waste disposal problems and methods is given, and types of wastes and their effects on the environment are reviewed. Wastes include general liquid wastes, sewage, industrial effluents, agricultural effluents, refuse, litter, and industrial refuse. Waste disposal can cause both water and air pollution. Air pollution sources include odors from various types of waste and incineration of waste.

37704

Flemming, B., F. Homola, J. Novak, and L. Seif

STUDY ON ENVIRONMENTAL CONDITIONS AND PROBLEMS IN THE SECTOR OF ENERGY PRODUCTION. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 57-61. (May 2-15.)

The history and kinds of environmental problems from energy production in Czechoslovakia are reviewed. As Czechoslovakia became more industrialized after the Second World War, more electric power plants were built. In 1965, total electric power consumption was 35,600 million kWh. Most of the fuel is coal, followed by crude oil, natural gas, nuclear power, water-generated, and imported. Environmental problems include air pollution due to sulfur dioxide, smoke, soot, and fly ash. From 1957 to 1967 the quantity of fly ash in the atmosphere increased 2.5 times and that of SO₂ 2.7 times. Desulfurization of liquid fuels or natural gas and other control methods can reduce the pollution problems caused by power plants. Power plants produce 22% of the particulates and 30% of the gaseous pollutants emitted into the atmosphere.

37705

Gilgen, A.

A STUDY OF ENVIRONMENTAL CONDITIONS AND PROBLEMS IN THE SECTOR OF TRANSPORTATION. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 89-97. (May 2-15.)

Traffic affects the environment in various ways including noise, air pollution, water pollution, space requirements, and aesthetics, which are discussed. The total volume of transportation and the gross national product have been related since 1930. Increased traffic (motor vehicles, railways, and aircraft) has caused increased air pollution from carbon monoxide, nitric oxide, aliphatic hydrocarbons, and unburned fuel. Gaseous pollutants can affect the respiratory tract, cause increased

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morbidity, cause odors, and affect climatic conditions. To reduce automotive pollution, automobiles should be equipped with exhaust and evaporative emission controls, cars should be inspected, and roadways should be designed with air pollution control in mind.

37706

Giner, J., A. H. Taylor, and F. Goebel

LEAD/ACID BATTERY DEVELOPMENT FOR HEAT ENGINE/ELECTRIC HYBRID VEHICLES. FINAL REPORT. Tyco Lab., Inc., Waltham, Mass., Environmental Protection Agency Contract EHS 71-009, Rept. APTD-1346, 203p., Nov. 1971. 46 refs.

A report is presented on a program to develop a lead-acid battery system for use in a hybrid heat engine/electric vehicle which produces a more nearly constant power output and less air pollutants than the conventionally-powered internal combustion type vehicle. Basic requirements are that the battery be capable of supplying high rate power pulses and accepting high rate charge pulses, both of short duration. The maximum power ratings specified are for 92.5 KW for a 10-second period with an average maximum power output of 70.5 KW over a 25-second period. The maximum recharge rate is 39 KW, and in the most severe cycle 980 Whr of energy are transferred to or from the battery. A 5-year lifetime is envisaged, and the battery must withstand a total of 200,000 cycles. Minimum working voltage is 200 volts with a minimum of 1.5 volts/cells. Preferred battery weight is 450 lb maximum with a projected cost of no greater than \$50. Topics covered in the report of the program include: state-of-the-art investigations; preliminary design studies; electrochemical problem area studies; corrosion of substrate materials; development and mechanical testing of structures; life testing of new design plates; battery design and preliminary cost analysis; and summary of achievements, evaluation of the main areas requiring further development, and preliminary work plan.

37707

Hoetker, D. and L. Wierling

ENVIRONMENTAL PROBLEMS IN THE AREA UNDER THE JURISDICTION OF THE REGIONAL PLANNING AUTHORITY OF THE RUHR COAL-MINING DISTRICT. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 340-348. 8 refs. (May 2-15.)

The development of the Ruhr basin into a concentrated industrial area is reviewed, and the environmental problems arising due to industrialization are described. Specific problems include air pollution, noise, water pollution, and problems of material structure. In 1969, the Ruhr area had 192,700 tons of dust fall, which is 10% of the total dust fall in the Federal Republic of Germany. Sulfur dioxide concentrations in 1967/1968 were approximately 0.23 mg SO₂/sq m air. Both of these pollutants have been reduced. Various sources and effects, legislation, investments, and institutions are reviewed with respect to the various problems. The pollution of the Ruhr area is a serious problem which should be studied on a regional basis.

37708

Kramer, H.

IDENTIFICATION OF DOMESTIC HEATING GENERATED EMISSIONS. (Emissionskataster fuer den Hausbrand). Text in German. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany). Frankfurt am Main, West Germany. 1971, p. 50-55. (Nov. 4-5.)

A survey of the domestic heating-generated emissions in the Lower Main Region, conducted within the framework of an hygienic and meteorologic study of that area, is described. The

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survey covers all domestic heating units up to a capacity of 800,000 kcal/hr. The data necessary for the survey are taken from chimney-cleaning records and from statistical data concerning the population and the number of dwelling units. Since the latter data do not allow relevant conclusions, the survey is completed with inspections of all heating units for the determination of the kind of the energy carrier used, and of the calorific requirement of the dwelling units with respect to peculiarities in construction, situation, and climatic conditions. The survey area is subdivided to 500 by 500 m unit surfaces for the investigation.

37709

APTIC NO. 66622

Laer, R. van

DESCRIPTION OF THE MOTOR VEHICLE TEST PRESCRIBED BY THE CEC FOR AIR POLLUTION ABATEMENT. (Beschrijving van de proeven op automobiellovertuigen voorgeschreven door de Raad van de Europese Gemeenschap tot bestrijding van de luchtverontreiniging). Text in Dutch. Ingenieursblad, 40(15-16):439-442, 1971.

The testing apparatus and the motor vehicle exhaust emission test procedure prescribed by the Council of the European Community for exhaust emission abatement are described. The testing apparatus is composed of a dynamometer stand for the simulation of various operating conditions, exhaust gas sampling devices, and measuring instruments for the determination of the carbon dioxide, carbon monoxide, hexane, and oxygen concentrations in the exhaust gas. The CO, CO₂, and hexane contents are determined by the infrared absorption method, while the O₂ concentration is measured by the exploitation of the paramagnetic property of oxygen. Test No. 1 envisages the determination of the CO and hexane emission from the vehicle after cold start in city traffic, while test No. 2 is intended for the measurement of the CO emission at idle. Test No. 3 is concerned with the crankcase emissions. One cycle corresponds to a travel length of 1013 m at an average speed of 19 kg/hr. One cycle duration is 3 min 15 sec. The CO and hexane emissions per test are limited to 182 g and 13.1 g, respectively.

37710

APTIC NO. 66911

Laskorin, B. N.

A STUDY ON ENVIRONMENTAL CONDITIONS AND PROBLEMS IN THE CHEMICAL AND PETROCHEMICAL INDUSTRY. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 74-81. (May 2-15.)

The USSR has adopted codes and invested in research for preventing atmospheric and water pollution from the chemical and petrochemical industries. Soviet maximum individual and mean daily allowable concentrations are 0.0085 and 0.85 mg/cu m for nitrogen dioxide, 5 and 1.5 mg/cu m for benzene, 3 and 1 mg/cu m for carbon monoxide, and 3 and 3 mg/cu m for ethylene, respectively. Plant locations, reorientations, and equipment requirements are now governed by environmental considerations. Major atmospheric pollutants from chemical and petroleum industries are hydrocarbons, carbon monoxide, hydrogen sulfide, carbon disulfide, sulfuric anhydride, oxides of nitrogen, chlorine, carbon black, inorganic dust, fluorine compounds, arsenic, tin, and mercury. Pollution control is effected by reducing the absolute quantities of harmful gas emission through improved technological measures and design factors and by purifying or by rendering harmless the gas emission containing the harmful contaminants. These methods and water pollution control methods are described.

37711

APTIC NO. 66670

Mammarella, Luigi

ENVIRONMENTAL POLLUTION IN LATIUM WITH SPECIAL REGARD TO AIR POLLUTION. (L inquinamento ambientale nel Lazio con particolare riguardo a quello atmosferico). Text in Italian. Istituto di Fisica dell'Atmosfera, Rome (Italy), IFA-RDP Rept. 39, 19p., March 1971. 15 refs. (Presented at the Amici di Montemario Association, Conference on Pollution in Latium, Rome, Feb. 27, 1971.)

NTIS: N72-28645

General problems of soil, water, and air pollution in Latium in general, and in Rome in particular are discussed. The respective contributions by domestic heating, vehicle traffic, and industry to the global air pollution in Rome are 60%, 30%, and 10%. The share of traffic-generated air pollution is rising due to the increasing traffic density, while that of domestic heating is on the decline. Sulfur dioxide, and especially carbon monoxide and nitrogen oxides, both generated by motor vehicles, are the predominant air pollutants in Rome. Considerable damages have been inflicted by air pollution to buildings and monuments.

37712

APTIC NO. 66583

Maquin, C.

PLASTIC MATERIALS AND THE ENVIRONMENT. THE TOTAL BALANCE OF NUISANCES. (Matières plastiques et environnement. Le Bilan Total Nuisances). Text in French. Syndicat professionnel des Fabricants de Matières Plastiques et résines Synthétiques, Paris (France). Commission Feu et Environnement, 4p., Oct. 1971. 3 refs.

Global environmental impacts of plastic materials are described by the setup of the total balance of nuisances considering all nuisances in the form of air, water, and soil pollution, odorous emissions, and noise, involved in raw material extraction, processing, manufacture, utilization, and disposal in waste form. The manufacture and processing of plastic materials entails little environmental nuisance and negligible air pollution in particular because the energy consumption is low due to most of the chemical reactions involved being slightly exothermal and to the low processing temperatures used. Some 75% of all plastic wastes can be incinerated without the hazard of air pollutant emissions, while the rest, consisting mostly of polyvinyl chloride generate hydrochloric acid emission, but no chlorine emission, upon their incineration. It is theoretically possible to abate HCl emissions from waste incinerators by neutralizing the HCl in the flue gases. Recycling of HCl would also be possible.

37713

APTIC NO. 66584

Maquin, C.

PLASTIC MATERIALS AND THE ENVIRONMENT. THE TURNOVER OF PLASTIC MATERIALS: INCINERATION, RECYCLING, PHOTODEGRADATION AND BIODEGRADATION. (Matières plastiques et environnement. Le cycle des matières plastiques. Incinération, récupération photo et biodegradation). Text in French. Syndicat professionnel des Fabricants de Matières Plastiques et résines Synthétiques, Paris (France). Commission Feu et Environnement, 10p., Oct. 1971. 2 refs.

Environmental aspects of the use, incineration, recycling, and disposal of plastic materials are discussed. The inherent high calorific value of plastic wastes may be beneficial in waste incinerators coupled with waste heat recovery units. Except for polyvinyl chloride (PVC), other common plastic materials decompose to carbon dioxide and water vapor upon incineration, while PVC generates hydrochloric acid during its incineration. Though the hydrochloric acid emissions from waste incinerator plants burning PVC are well below the maximum allowable concentrations, notwithstanding such emissions should be controlled. Controlled pyrolysis of plastic wastes in the absence of oxygen will result in combustible products; while controlled pyrolysis in the presence of oxygen yields alcohols, acetones, and esters. Monomers are obtained by complete pyrolysis or cracking. Photodegradable and biodegradable plastic materials are being studied.

37714

APTC NO. 59514

Mayer, Martin

A COMPILATION OF AIR POLLUTANT EMISSIONS FACTORS FOR COMBUSTION PROCESSES, GASOLINE EVAPORATION, AND SELECTED INDUSTRIAL PROCESSES. New Hampshire Univ., Durham, Center for Industrial and Institutional Development, Air Pollut. Sampling Monit. Workshop, Durham, N. H., 1971, 32p. 59 refs.

A compilation of source emission factors resulting from an extensive literature survey is presented for the principal combustion and industrial processes. The emission factors were compiled primarily for use in conducting an air pollutant emission inventory. Sources covered include: aircraft emissions; asphalt batching plants; automotive and diesel exhausts; cement production; coffee processing; coal, oil, and natural gas combustion; concrete batching plants; ferrous and non-ferrous foundries; gasoline evaporation; iron and steel mills; kraft pulp mills; acid manufacture; petroleum refineries; dry cleaning solvent evaporation operations; and refuse disposal and open burning. Appendices are also provided concerning sources of information useful in calculating total emissions and a method for calculating domestic fuel use from Bureau of Census data.

37715

APTC NO. 58876

Murray, R. G. and R. J. Schoeppel

EMISSION AND PERFORMANCE CHARACTERISTICS OF AN AIR-BREATHING HYDROGEN-FUELED INTERNAL COMBUSTION ENGINE. Society of Automotive Engineers, Proc. Intersociety Energy Conversion Eng. Conf., Boston, Mass, 1971, p. 47-51. 14 refs. (Aug. 3-6, Paper 719009.)

The performance and emission characteristics of a standard production gasoline engine which was converted to run on the unconventional fuel hydrogen was studied. The engine appears to meet current and 1975 Federal emission standards. Not only is the engine capable of operating over a wider range of conditions and with lower nitrogen oxide emissions than its gasoline counterpart, but it is also capable of exceeding the manufacturer's maximum power rating. Performance data and emission characteristics are presented, and details of the engine's design are included. The engine produced no hydrocarbon, carbon monoxide, carbon dioxide, sulfur, lead, or organic compound emissions. At 28, 49, 65, and 104% of peak power, 63, 201, 212, and 365 ppm of NO_x, respectively, were produced.

37716

APTC NO. 56656

Osterli, Victor P.

WASTE DISPOSAL. In: *Combustion-Generated Air Pollution. A Short Course on Combustion-Generated Air Pollution* held at the University of California, Berkeley September, 22-26, 1969. Ernest S. Starkman (ed.), New York-London, Plenum Press, 1971, p. 257-273. 25 refs.

Problems of solid waste disposal with emphasis on agricultural wastes are outlined. Agricultural wastes are disposed of mainly by spreading on land and burning, while the most common alternate method of disposing of field crop, row crop, and fruit and nut crop residues is to incorporate the material directly into the soil by discing, chipping, or shredding. A study of the Bay Area Air Pollution Control District in California during the seven-year period, 1959-1965, revealed a 9% reduction in the volume of deciduous fruit, grape, and nut tree pruning and dead trees disposed by the burning. A recently completed survey of agricultural burning in the Sacramento Regional Area Planning Commission jurisdiction showed that only 15% of the agricultural crop residues are burned. A study of the effluent from 123 fires of various agricultural wastes has indicated that the contribution of total hydrocarbons from agricultural burning is very small when compared to automobile exhaust. Particulate matter collected in California field study averaged 15.5 lbs of particulate per ton of fuel burned. Rice growers in the Sacramento Valley are participating in a program of burning

stubble and straw only under meteorological conditions favorable to the best dispersal of smoke.

37717

APTC NO. 60717

Savage, John A.

A STUDY OF FUELS FOR ELECTRIC GENERATING PLANTS. Oklahoma State Univ., Stillwater, Okla., Dept. of Electrical Engineering, Frontiers Power Technol. Conf., Proc., Annu. Meet., 4th, Stillwater, Okla., 1971, p. 2-1-2-9. 4 refs. (Sept. 30.)

Factors affecting the choice of fuels for power plants are examined in terms of their environmental impact, economic progress, and national security. Proven reserves of crude oil in the United States have declined from a 13 year supply to a 9 year supply over the past 10 years, and the reserve productive capacity of the domestic industry needed to offset loss of imports in emergencies has largely evaporated. Nuclear power plants are lagging two to three years behind the level predicted five years ago because of rising costs, regulatory problems, and environmental pressures concerning thermal pollution and radiation hazards. Low sulfur regulations for improving air quality are creating a rush on residual oil with the demand exceeding the supply, and the use of coal suffers from the disadvantage of almost impossible problems with sulfur removal. The Philadelphia Electric Company estimates that a change-over to low-sulfur oil will add about \$6 million to its annual fuel costs. The present sources of energy are divided as follows: oil, 44%; natural gas, 32%; coal, 20%; hydropower, 4%; and nuclear power, less than 1%.

37718

APTC NO. 60719

Scarth, E. D.

THE PLANNED USE OF ABUNDANT SOURCES OF LIGNITE FOR GENERATION OF ELECTRICAL ENERGY. Oklahoma State Univ., Stillwater, Okla., Dept. of Electrical Engineering, Frontiers Power Technol. Conf., Proc., Annu. Meet., 4th, Stillwater, Okla., 1971, p. 1-1-1-11. 1 ref. (Sept. 30.)

The proposed use of lignite, a low grade coal, by the Texas Utilities Company System for the generation of electric power is reviewed. Three lignite-fueled plants are currently in various stages of design or construction near large lignite deposits in much of central and east Texas. The lignite has a low sulfur content, and highly efficient electrostatic precipitators are being installed to control the emission of particulates. The plants will have a higher first cost than comparable gas-fired plants because of requirements for larger boilers, extensive coal-handling facilities, and expensive ash removal systems; the additional investment, however, will be offset by a lower fuel cost.

37719

APTC NO. 60824

Schoenberger, Robert J.

SOLID WASTE-THE THIRD POLLUTION. In: *Environmental Health*. P. Walton Purdom (ed.), New York, Academic, 1971, Chapt. 6, p. 295-350. 56 refs.

All aspects of solid waste technology including collection and disposal practices are reviewed. Present methods of collection are the most inefficient and costly portions of an overall solid waste management scheme. Seventy-nine percent of the solid waste cost of local governments is for collection. The collection system has two distinct components: the generation portion and the transportation portion. Land disposal or the burying of waste is the only approved method of disposal which is performed at a single site. Incineration, composting, and salvage are either a form of refuse handling or processing, they are not complete methods of disposal, and they require disposal of residue or the removal for sale or internal consumption of compost. Miscellaneous methods of disposal that are discussed include: hydropulping, pyrolysis, high temperature incineration, compaction and baling, and disintegration. The economics of solid waste systems are also discussed.

37728

APTIC NO. 60725

Scholz, N. K. H.

ENVIRONMENTAL PROBLEMS OF TURBOJET ENGINES. (Die Umweltwirkungen von Turboflugtriebwerken). Text in German. Deutsche Gesellschaft fuer Luft- und Raumfahrt, Baden-Baden (West Germany), 36p., 1971. 37 refs. (Presented at the Deutsche Gesellschaft fuer Luft- und Raumfahrt, Baden-Baden, West Germany, Oct. 11-13, 1973, Paper 71-071.)

NTIS: N72 19030

Problems of heat radiation, noise, and air pollution, generated by aircraft turbojet engines, and ways of abating them are described. Carbon monoxide, unburned hydrocarbons, nitrogen oxides, and smoke are the basic emission components in turbojet engine waste gases, while sulfur and lead are present in negligible quantities. The combustion temperature in the primary zone abruptly reaches 2200 K to lower to about 1200 K in the mixing zone after the intermediate zone. The hydrocarbon CO, and nitric oxide concentrations are highest in the high-temperature section of the primary zone and gradually decrease in the intermediate and mixing zones through cooling and dilution. The CO formation initially corresponds to the chemical equilibrium and maintains a rather high concentration due to the hold time in the intermediate and mixing zones being too short. The CO emission could be reduced consequently by enlarging and extending the intermediate and mixing zones. The NO concentration can be reduced by shortening the dwelling time in the primary zone which, on the other hand, would result in increased CO concentration. Smoke formation takes place mostly in the primary zone of the turbojet engine. Maintenance of a peak temperature of 1800 K in the primary zone, extension of the intermediate zone, reduction of the fresh air supply to the mixing zone, and improvement of the fuel distribution by new atomization and evaporation processes are among the basic trends in turbojet engine design in view to emission abatement.

37721

APTIC NO. 12852

Terracciano, Louis

EMISSION SURVEY OF MUNICIPAL GARBAGE INCINERATOR, KASSEL, WEST GERMANY. York Research Corp., Stamford, Conn., Air Pollution Control Office Contract, Rept. 71-C1-16, York Rept. Y-7394-G, 112p., Sept. 3, 1971.

An emission test program was conducted at the municipal waste incinerator at Kassel, West Germany. Sampling for particulate matter was performed with the Air Pollution Control Office test procedures on the inlet and outlet of an electrostatic precipitator which is used to control emissions from the incinerator. Other contaminants were sampled by the VDI method. This data will be used to determine Federal standards for emissions from refuse incinerators. The secondary objective is to compare APCO and VDI (Verein Deutscher Ingenieure) methods of testing by comparison of results. The outlet particulate emissions at the probe, cyclone, and filter were 0.127, 0.0231, and 0.0268 gr/SCFD; the total catch was 0.1310, 0.0309, and 0.0311 gr/SCFD. Flue gases were analyzed by the Orsat method.

37722

APTIC NO. 60750

Zwick, E. B., T. R. Mills, and R. Fiorito

EVALUATION OF A LOW NOX BURNER. (FINAL REPORT). Paxve, Inc., Newport Beach, Calif., Office of Air Programs Contract EHS 70-125, Rept. APTD-0980, 318p., July 28, 1971. 15 refs.

Results are presented from an investigation of the Paxve burner, a low emission combustion system developed in conjunction with work on an automotive Rankine cycle engine. Topics covered include: characteristics of the Paxve burner, influence of the vapor generator on burner emissions, influence of non-uniform flow distribution on emissions, theoretical analysis, data correlation, and emission measure-

ment problems. The Paxve combustion process which consists of a structure embodying certain fuel injection and combustion concepts along with operating conditions favoring low emission is capable, in its normal mode of operation, of achieving 0.1 g/Kg oxides of nitrogen, carbon monoxide levels of less than 1.0 g/Kg, and hydrocarbon values which are undetectable. The combustion process appears to require more sophisticated measurement devices than those currently available for testing vehicle emissions.

37723

APTIC NO. 59062

Illinois State Water Survey, Urbana

RESEARCH NEEDS ON WASTE HEAT TRANSFER FROM LARGE SOURCES INTO THE ENVIRONMENT. 41p., Dec. 1971. 3 refs.

NTIS: N73-17348

A conference was held to evaluate research needs on problems of waste heat transfer from large thermal sources, such as electric generating plants, into the environment. A group of 27 experts from a broad cross section of professional activities reviewed the knowledge of present and projected environmental effects resulting from large injections of waste heat into the environment by means of wet and dry cooling towers and cooling ponds, lakes, and streams. Complicated interactions of the physical, engineering, biological, social, and economic factors are discussed. Key problem areas and needs and directions for further research and action are emphasized. Various alternatives for waste heat disposal are listed. Alternatives relative to various climatic regimes and local resources in order that environmental consequences might be minimized without excessive delays and costs are reviewed. Improved techniques for power generation, management of research efforts, and suggested research topics are discussed. (Author abstract modified)

37724

APTIC NO. 60511

Provincial Board of Economic Planning, Katowice (Poland), Provincial Study Group of Regional Plans

A STUDY OF ENVIRONMENTAL CONDITIONS AND PROBLEMS IN THE INDUSTRIAL REGION OF UPPER SILESIA. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 151-155. (May 2-15.)

The environmental conditions in the Upper Silesian Industrial Region (USIR) in Poland are described. This area is heavily industrialized and urbanized and has many coal mines, steel works, farms, and highways. The many industrial and non-industrial air pollution sources have caused reduction of solar radiation by 40%, soiling of dwellings and clothes (500 tons/sq km dust fall/yr), and damage to vegetation. The natural landscape has been transformed by dumping, mines, and other activities, and water has been polluted. Increased expenditures have been made to reduce air and water pollution. From 1966 to 1970, 180 million dollars were spent on air pollution control. State and national standards and regulations are being set up which are administered by various control agencies. Several regional development plans have been established to rehabilitate the environment.

37725

APTIC NO. 60544

United Nations Economic Commission for Europe, New York

STUDY ON ENVIRONMENTAL CONDITIONS AND PROBLEMS IN THE SECTOR OF BUILDING AND RELATED INDUSTRIES. Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 81-88. 5 refs. (May 2-15.)

The main nuisances from building sites are danger to persons living next to them or to passers-by, interference with pedestrian and vehicular traffic, disturbance to the neighboring buildings and infrastructure, environmental pollution by dust

and other substances, and noise. National legislation in Belgium concerning building construction is reviewed. According to legislation and regulations, builders are required to take precautions to avoid injury to trees and plantations. Lime slaking, transport of earth, sand blasting, and other processes must be done so that air and water pollutants are not emitted. The effect on the environment of extracting, processing, manufacturing, and utilizing building materials taken from the earth is reviewed. Mineral substances from mines, open cast mines, and quarries are discussed, including porphyry, limestone, portland cement, and lime. There are no national standard concerning dust suppression from cement and lime processing, but each installation is governed by special measures according to its size, geographical situation, and degree of pollution. Sandstone, quartzite, sand, and terracotta (baked clay) processing are described, and pollution emission and control in these industries are mentioned. Prevention and control methods for pollution from asbestos cement are quite effective.

37726

APTIC NO. 60922

National Petroleum Council, Washington, D. C., Committee on U. S. Energy Outlook

U. S. ENERGY OUTLOOK: AN INITIAL APPRAISAL 1971-1985. VOLUME ONE. AN INTERIM REPORT. 79p., July 1971. 12 refs. VOLUME TWO. SUMMARIES OF TASK GROUP REPORTS. AN INTERIM REPORT. 231p., Nov. 1971. 21 refs.

The energy outlook from 1971 to 1985 is reviewed. Supply-demand relationships are projected assuming that current government policies and regulations and the present economic climate for the energy industries would continue without major changes. This initial appraisal uses generally optimistic assumptions, and therefore is not a forecast of what will happen, but rather of projection of what may happen. Energy consumption would grow at a rate of 4.2%/yr during this period; domestic supplies would grow at a slower rate than domestic supplies, thus making the nation increasingly dependent on imported supplies. The supplies and demands for petroleum liquids, gas, coal, nuclear power, and other fuels are projected. In order to achieve the initial appraisal energy balance, the capital outlays for resource development, manufacturing facilities, and primary distribution in the U. S. would have to total approximately \$375 billion over the 1971-1985 period. Not included in this estimate are other major sums for petroleum marketing, gas and electricity distribution, and the development of overseas natural resources needed to satisfy U. S. import requirements. The implications of this appraisal are given with regard to government policies, physical facilities, financial requirements, and technology. Task group reports are given on energy consumption, oil supply and demand, oil logistics, oil and gas capital requirements, gas supply and demand, gas transportation, coal, nuclear power, oil shale, tar sand, and hydropower and new energy forms.

1970

37727

APTIC NO. 60694

Barabokhina, G. K. and A. V. Monastyrev

DETERMINATION OF THE DUST CONTENT IN WASTE GASES EMITTED BY INDUSTRIAL LIME KILNS. (Opredeleniye zaplyennosti otkhodyashchikh gazov promyshlennykh izvestoobzhigatel'nykh pechey). Text in Russian. Sb. Tr. Gos. Vses. Nauch.-Issled. Inst. Stroit. Mater. Kontr., no. 18:132-138, 1970. 3 refs.

Results of dust emission measurements at industrial lime kilns are presented. The amount of dust entrained by the waste gases emitted by rotary kilns without a dust separator was 2.2 to 8.4% of the total capacity, while the dust entrainment from shaft kilns ranged from 2.3 to 17%. Shaft kilns fired with gaseous fuel emitted less than 0.1% of the throughput. Granulometric investigations revealed that the dust emitted is composed

of particles smaller than 0.28 mm. The dust emitted was composed mainly of calcium and magnesium carbonates and of up to 20% of free calcium and magnesium oxides. Shaft furnaces fired with solid fuel emitted up to 30% coal dust. Lime kilns are not permitted to be operated without adequate dust separators, because otherwise the dust concentrations would far exceed the maximum allowable level of 100 mg/cu m.

37728

APTIC NO. 60746

Coster, J. -P. de

AIR POLLUTION BY MOTOR VEHICLES. (La pollution de l'air par les moteurs de véhicules). Text in French. Rev. Serv. Publ., 32(1):17, 19-24, 1970.

The air pollutants emitted by gasoline engine and diesel engine-powered vehicles, their effects on human health, and their specific amounts are reviewed. Carbon monoxide, nitrogen oxides, light hydrocarbons, condensable products such as unburned hydrocarbons, peroxides, aldehydes, soot, heavy hydrocarbons, carbon, lead, lead oxides, phosphorus compounds, and sulfur dioxide are the principal pollutants emitted by motor vehicles. Carbon monoxide may be present in exhaust gases at rates of up to 10%. It is toxic due to combining with hemoglobin, thus reducing the oxygen supply. The unburned hydrocarbon and nitrogen oxides concentrations in the exhaust gas range from 300 to 4000 ppm and from 30 to 3000 ppm, respectively. Aldehydes, emitted in concentrations of 10 to 300 ppm, have both toxic and irritating effects on the human organism. Particulate emissions include 3,4-benzopyrene which is carcinogenic. Hydrocarbons are also emitted by the crankcase and by evaporation of the fuel. The exhaust gases emitted by gasoline engine at idle contain an average of 7% CO, 0.5% hydrocarbons, 30 ppm nitrogen oxides, and 30 ppm aldehydes. The corresponding figures for acceleration are 2.5%, 0.2%, 1050 ppm, and 20 ppm. Steady drive is responsible for 1.8% CO, 0.1% hydrocarbons, 650 ppm nitrogen oxides, and 20 ppm aldehydes. Exhaust gases emitted during deceleration contain 2% CO, 1% hydrocarbons, 20 ppm nitrogen oxides, and 300 ppm aldehydes.

37729

APTIC NO. 60709

Korshun, M. N.

ON THE SIGNIFICANCE OF SECONDARY POLLUTION OF THE AIR BY MERCURY VAPOR. (K voprosu o samostoyatel'nom gigenicheskom znachenii vtorichnogo zagryazneniya vozdukhа parami rtuti). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), vol. 35:194-199, Jan.-March 1970. 10 refs.

Working areas which formally involved work using mercury but which had not been involved in mercury use for several years were studied. Air quality in these areas and the concentration of mercury in equipment and articles in the rooms were measured. Mercury vapor was absorbed by various pieces of equipment and reached 0.005 mg/g. These articles then gave off mercury vapor. On the grounds of a power plant near the buildings, 0.9 micrograms/cu m of Hg vapor was discovered in the air 6 years after work with mercury had been completed. Another 2 micrograms/cu m were found in the air within the building with the floors, ceilings, internal partitions, and sub-floors removed. The probable sources of mercury were depots in the structure of the building and the soil on the grounds of the plant. All soil samples contained 0.05 mg/100 g within a radius of 30 m of the plant, and 40% of the soil at 100-150 m from the plant contained this amount. At these sites, the concentration in the air was 0.3 micrograms/cu m. The health of persons who had worked in the mercury-polluted buildings was studied. There were frequent complaints of headache, fatigue, general lassitude, and irritability. Neurological examinations showed mild disturbances. Primary functional disturbances of the central nervous system were found in 57.1% of the subjects. Mercury-contaminated structures were removed, walls were heated to remove Hg, subfloors were opened to outside air, various substances were applied to

EMISSION SOURCES

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walls, and other measures were taken to remove and reduce the Hg concentrations in possible secondary sources.

37730

APTIC NO. 60835

Snoeck, M. M.

THE CONTRIBUTION OF DOMESTIC HEATING TO AIR POLLUTION. (Responsabilite du chauffage domestique dans la pollution atmospherique). Text in French. Rev. Serv. Publ., 32(6):65-68, 1970.

General problems and possibilities for the abatement of domestic heating-generated air pollution are discussed. Sulfur dioxide and sulfur trioxide, formed from sulfur-containing coals and fuel oils; particulate matter; and carbon monoxide are the chief pollutants generated by domestic heating equipment. Sulfur dioxide emissions can be abated by the use of expensive desulfurized fuels, and equally expensive high chimneys. Also, it is practically impossible to maintain complete combustion in small-sized domestic heating equipment. All these drawbacks of individual domestic heating demonstrate the superiority of centralized and remote heating systems where pollution control measures, such as the construction of high chimneys, optimum control of the combustion conditions, and even flue gas purification cannot be implemented in an economically more acceptable manner. Air pollution measurements carried out in Liege showed that the contribution of domestic heating to overall air pollution is in a range of 12-18% during the summer period, and about 40% during the heating season.

37731

APTIC NO. 60827

Trefois, M. A.

METALLURGY AS A POLLUTING INDUSTRY. (La Siderurgie en tant qu'industrie polluante). Text in French. Rev. Serv. Publ., 32(1):3-7, 9-16, 1970. 2 refs.

Problems of air pollution and techniques and equipment available for its abatement in metallurgy are surveyed. Sulfur dioxide, arsine, nitrogen oxides, fluorine and chlorine compounds, ozone, carbon monoxide, hydrocarbons, dust, aerosols, and smoke are the principal pollutants emitted by metallurgical plants. Dust chambers, settling chambers, cyclones, multicyclones, scrubbers, venturi scrubbers, and electrostatic precipitators are among the principal dust emission control equipment used in metallurgical plants. The dispersion of the pollutants can be essentially improved by high stacks. Modern metallurgical plants designed with respect to air pollution control include such emission control equipment as Pratt-Daniel dust separators for coke charging and for agglomerate transport equipment, wet methods of coke quenching, Multivortex dust separators for agglomeration lines, Centicell dust separators for agglomerate discharge, cyclone groups for coke handling at the blast-furnaces, and bag filters for the steel melting furnace.

37732

APTIC NO. 60672

Scott Research Lab., Inc., San Bernardino, Calif.

EFFECT OF LABORATORY AMBIENT CONDITIONS OF EXHAUST EMISSIONS. (FINAL REPORT). National Air Pollution Control Administration Project CPA 22-69-156, Rept. APTD-1350, 85p., April 24, 1970.

Program description and test results are reported for a study designed to determine the effect of laboratory ambient conditions on automobile exhaust emissions as accomplished at an all-weather chassis dynamometer room equipped for controlling air temperature over the range of 0-150 F and controlling humidity level from ambient to virtually 100%. Examination of the regression equations and multiple correlation values indicates that each type of exhaust emission (hydrocarbons, carbon monoxide, and nitrogen oxides) must be considered individually; additionally, each vehicle appears to react differently to the influences of temperature and humidity, but the effect, if real, is somewhat masked by the inconsistency

displayed by some vehicles. Appendix are provided giving mass emission determination, test data, linear regression equations by vehicle and phase, general quadratic regression equations by vehicle and phase, and composite vehicle correction factors.

1969

37733

APTIC NO. 60819

Public Health Service, Durham, N. C., National Air Pollution Control Administration

REPORT FOR CONSULTATION ON THE METROPOLITAN DAYTON INTRASTATE AIR QUALITY CONTROL REGION. Rept. APTD-1191, 75p., Sept. 1969. 6 refs.

Emission inventories in Dayton, Ohio are discussed in a report for consultation on the metropolitan Dayton intrastate air quality control region. Five pollutants were inventoried: total particulates, sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides. Only the first three are considered representative of the area. The results of the inventory were evaluated by a diffusion model to systematically predict the spatial and temporal distribution of the emitted pollutants. The results are tabulated by source category, pollutant type, and political jurisdiction. Coal combustion accounted for more than 74% of the total particulates emission of almost 103,400 tons/hr. Transportation sources contributed 3.4%, industrial processes 15%, and refuse burning 3.4%. Approximately 111,800 tons/yr of SO₂ are emitted; steam electric power plants contributed 57%; industry 38%; residential, commercial, and institutional establishments 4.5%. The major source of the 400,400 tons/hr of CO was gasoline-powered motor vehicles which emitted 91% of the total amount. Coal combustion in stationary sources accounted for 3.4%, and industry 3.1%.

1968

37734

APTIC NO. 56801

Pady, S. M., C. L. Kramer, and R. Clary

PERIODICITY IN AECIOSPORE RELEASE IN CYMNOSPORANGIUM JUNIPERI-VIRGINIANAE. Phytopathology, 58(3):329-331, March 1968. 3 refs.

Data are presented on the release of aeciospores from Gymnosporangium juniperi-virginianae, the cause of cedar-apple rust. Four Kramer-Collins spore samplers were set up, and samples were taken three times during the hour for a total of 10 min. The same leaf was used as long as spores were being produced, usually 6 to 8 days. Aeciospore release was diurnal, with a major peak between 6 and 8 am and on some days a minor peak 12 hr later. Spore release was correlated with declining relative humidity, and high relative humidity completely prevented such release. Highly hygroscopic peridial cells were the mechanisms that control the release of the aeciospores. (Author abstract modified)

1967

37735

APTIC NO. 60715

Lai, Yuan-Zong and K. V. Sarkanen

KINETICS OF ALKALINE HYDROLYSIS OF GLYCOSIDIC BONDS IN COTTON CELLULOSE. Cellul. Chem. Technol., vol. 1:517-527, 1967. 25 refs.

The alkaline degradation of cellulose and hemicellulose is a reaction of both fundamental and technological interest. In kraft pulping as well as in hot-alkali refinement of dissolving pulps, reactions of this kind may cause undesirable losses in pulp yield and necessitate the use of excessive alkali to neutralize the acidic degradation products. The mechanisms and kinetics of the reaction are described, and an experimental

reaction is discussed. The obtained kinetic data showed that the alkaline hydrolysis reaction of cellulose was relatively slow, even at 150-190 deg. The rate of the endwise degradation reaction is roughly by a factor of 10 to the 7th power times faster than that of the alkaline hydrolysis reaction in this temperature range. Since the activation energy of 36 Kcal/mole for the hydrolysis reaction is higher than the activation energy of 25 Kcal found for the endwise degradation reaction, this factor becomes higher at lower temperatures. The rate of alkaline hydrolysis reaction is insignificant in the hot-alkali refinement of dissolving pulps, commonly carried out at 90 to 120 deg. In the alkaline pulping systems, alkaline hydrolysis caused some yield losses and diminished fiber strength. The best strength properties for kraft pulp and optimal yield can be achieved in cooks that are performed at low temperatures using a high sulfidity and a minimum tolerable alkalinity. The same conditions are conducive of the ready formation and release of methyl mercaptan and other malodorous compounds which cause air pollution. Consequently, studies are needed to develop new chemical methods of accelerating the delignification process in alkaline pulping systems. (Author conclusions modified)

CONTROL METHODS

1974

37736

APTIC NO. 61200

Azuma, Kenko.

DEODORATION BY THE OZONE METHOD. (Ozone-ho ni yoru akushu jokyō). Text in Japanese. Kankyo Sozo (Eviron. Creation), 4(2):79-84, Feb. 1974. 13 refs.

The construction of ozone-deodorizers and ozonizers and their applications and effects are reviewed. The efficiency of ozone formation in modern ozonizers is about 1 mg/min for 1 watt discharge energy. Ozone is effective against mercaptans, sulfides, trimethyl amine, dimethyl amine, phenols, and lower unsaturated hydrocarbons. Most of these are oxidized by ozone or neutralized in odor by the odor of ozone itself. For sewage disposal odor, in which hydrogen sulfide and ammonia, as well as amines, mercaptans, and sulfides are predominant, 0.45-0.9 ppm ozone is necessary. In a plant where fish are treated, 1.5-3.0 ppm ozone is necessary to suppress the odor of amines and ammonia. Kraft pulping waste water can be successfully treated with ozone. Also, ozone treatment combined with treatment by active carbon is a very efficient deodorizing method.

37737

APTIC NO. 61229

Brandstetter, W.

MATHEMATICAL SIMULATION OF THE POLLUTANT CONVERSION IN THERMAL REACTORS DURING THE WARMING UP PHASE. (Mathematische Simulation der Schadstoffkonvertierung in thermischen Reaktoren während der Aufwärmphase). Text in German. Oesterr. Ing. Z., 17(4):137-143, 1974. 8 refs.

A mathematical model is described for the simulation of the thermal and chemical processes in automobile exhaust gas afterburners. The model is based on a thermal reactor composed of a series of small reactors switched in tandem. A perfect mixing process is assumed for these reactors. If the conditions at the reactor entrance and certain peripheral conditions are known, the pollutant concentrations of carbon monoxide, unburned hydrocarbons, and oxides of nitrogen (as well as the gas and wall temperatures in the reactor and at the exit) can be calculated. The reaction kinetic parameters were first taken from literature; however, it became apparent that corrections were necessary in order to arrive at an acceptable agreement between calculated and measured values. For part of the flow,

AIR POLLUTION ABSTRACTS, AUGUST 1974

incomplete mixing of the exhaust gases with secondary air had to be assumed. The heat losses were increased through correction of the heat transfer numbers since the calculated gas temperatures were considerably higher than the measured values. Satisfactory agreement was then achieved with a ceramic thermal reactor in the CVS test cycle and a metallic reactor in the 7-mode California cycle.

37738

APTIC NO. 60401

Christian M.

REDUCED POLLUTANT EMISSION THROUGH HYBRID DRIVES. (Verringerte Schadstoffemission durch Hybridantrieb). Text in German. Automobiltech. Z. (Stuttgart), 76(1):5-8, 1974.

A hybrid drive operating with combustion engine and hydromotor is described. The mode of operation is the four operating phases, acceleration, cruising, idling, and braking is illustrated. The combustion engine operates only at times during cruising operation and stands still during starting, acceleration, and idling. The pollutant emission is relatively lower the more often the car has to halt, particularly in inner city traffic during rush hour. A comparison with a conventional drive showed that under California test conditions with many stops the BMW 2000 equipped with a conventional engine emitted 15.75 g/km carbon monoxide and 0.685 g/km hydrocarbons, and the BMW 2000 equipped with the hybrid drive emitted in the same test 3.16 g CO/km and 0.110 g HC/km. The hydromotor is far lighter than presently available electric batteries. It operates with 300 kg/sq cm pressure oil.

37739

APTIC NO. 61263

Christiansen, Lars J.

PHASE EQUILIBRIA PROBLEMS IN THE SEPARATION OF H₂S, CO₂, AND CO FROM NATURAL GAS MIXTURES. (Phasengleichgewichtsprobleme bei der Abscheidung von H₂S, CO₂ und CO aus Erdgasgemischen). Text in German. Erdoel Kohle Erdgas Petrochem., 27(3):130-134, 1974. 45 refs.

In the separation of undersirable and polluting components (carbon dioxide, carbon monoxide, and hydrogen sulfide) either from natural gas or in the processing of synthetic natural gas, it may be profitable to use a high pressure cryogenic separation process. In order to design and optimize such a unit, it is necessary to have detailed and reliable information regarding the multicomponent phase equilibria of the mixtures entering into the process. To predict multicomponent phase equilibria accurately, it is necessary to obtain exact binary phase equilibrium data over the desired temperature and pressure range. These data are then used together with an adequate thermodynamic model for the prediction of the multicomponent phase equilibria. A literature survey of data on the necessary binary mixtures including CO₂, CO, nitrogen, H₂S, methane, and ethane is given, and various methods for predicting multicomponent phase equilibria are discussed. The methods are exemplified by calculation of the ternary vapor liquid equilibria for the CO₂-CH₄-CO and H₂S-CO₂-CH₄ systems.

37740

APTIC NO. 61210

Chrusciel, Romuald

NEUTRALIZATION OF COMBUSTION PRODUCTS BY GASEOUS AMMONIA. (Neutralizace spalín plynů amoniakem). Text in Czech. Chem. Průmysl (Prague), 24/49(2):89-91, 1974. 27 refs.

Laboratory experiments in Poland, with the assistance of the U. S. Environmental Protection Agency, have shown that the deleterious effects of sulfur dioxide and of sulfuric acid mists on animal and plant life can be eliminated by neutralization with gaseous ammonia. Animals subjected to SO₂ inhalation had decreased serum proteins and blood electrolyte equilibria, and a high acid-base balance; these parameters were virtually

normal in animals which had been exposed to mixtures of SO₂ and NH₃. Various crops (sunflower, rape, and clover) were reduced by exposure to SO₂ but showed increases after exposure to the SO₂ - NH₃ mixture. Successful experiments on a pilot-plant scale entailed release of the required amount of NH₃ into the combustion gases of a chimney at a power plant; full-scale experiments at the 2000 MW power plant are to follow.

37741

APTIC NO. 60881

Coursey, Joseph F.

IRON FOUNDRY CUPOLA RECUPERATIVE EMISSION CONTROL DEMONSTRATION-- DESIGN MANUAL. Flynn and Emrich Co., Baltimore, Md., Environmental Protection Agency Contract 68-02-0286, Program Element 1AB013, ROAP 21ARO-02, EPA-650/2-74-004, 51p., Jan. 1974.

The utilization of the heat in exhaust gases from an iron foundry cupola melting operation has been an objective of the industry. Unfavorable economics and technical limitations, however, have limited development and employment of cupola waste heat devices to a relatively few installations. The recent laws requiring air pollution control on cupolas have resulted in major capital expenditures in cupola melting facilities. This required control, together with recent energy shortages, has led to renewed interest in waste heat recovery methods. Therefore a dry media heat exchanger for producing hot blast air for cupola energy shortages, has led to renewed interest in waste heat recovery methods. Therefore, a dry media heat exchanger for producing hot blast air for cupola melting was tested for technical feasibility. The validity of the economic assumptions that indicate a savings in fuel, air pollution equipment costs, and a new reduction in operating costs was studied. The system is described, estimates of the gross economic benefits are provided, the capital cost of the system is presented, and the operation of the system to data is described. Installed cost for the complete system including the cupola will be about \$342,000. Installed cost for the recuperative emission control system alone will be about \$171,000. When used solely for hot blast, coke savings of over 20% are projected. At a nominal operating condition, coke savings of approximately 10% are projected; in addition, there will be nearly 3.5 million Btu/hr of surplus energy available in the form of clean, hot air. (Author abstract modified)

37742

APTIC NO. 61090

Dauve, Roger

DEODORIZER FOR A PULP MILL. (Pollution. Un desodorisant pour usine de pate). Text in French. Papier Carton Cellulose, 23(1/2):46-47, Jan.-Feb. 1974.

Method and equipment for the deodorization of pulp mill-generated waste gases, containing sulfur dioxide, hydrogen sulfide, and mercaptans below the maximum allowable levels, are described. Deodorization is done by means of a masking agent which is introduced into the waste gas flow in the form of aerosol at expenditures depending on the waste gas output and the odor intensity. The specific expenditure ranges from 0.05 to 0.1 kg masking agent per 1000 cu m waste gas.

37743

APTIC NO. 61184

Dietrich, Karl Rolf

MEASURES AGAINST AIR POLLUTION IN EMITTING BIOLOGICAL WASTE WATER PURIFICATION PLANTS. (Luftreinhalte-massnahmen fuer emissionsstraechtige biologische Abwasserreinigungsanlagen). Text in German. Gesund. Ingr., 95(2):36-38, 1974.

Waste water with odorous chlorinated hydrocarbons remains from the production of vinyl chloride, the dehydrogenation of ethyl benzene to styrol, acrylonitrile production, tanneries, and chemical industries. To avoid these emissions, closed basins are quite efficient. Tubular plastic aeration reactors

which are completely enclosed are recommended to lower costs. These reactors allow high decomposition speeds of the organic matter, shortening the residence time and required reactor volume. Instead of air, oxygen is used for aeration and the water flow achieves optimum mixing with oxygen. Gas exhausters are installed for drawing off the odorous gases and vapors which are cleaned in packed towers prior to discharge into the atmosphere. In severe cases, combustion of the gases and vapors at temperatures up to 1300 C can be applied.

37744

APTIC NO. 61348

Dunham, James T., Carl Rampacek, and T. A. Henrie

HIGH-SULFUR COAL FOR GENERATING ELECTRICITY. Science, 184(4134): 346-357, April 19, 1974. 25 refs.

The use of high sulfur coal for generating electricity is proposed to help alleviate the oil and natural gas shortage. Air pollution regulations which restrict sulfur oxide emissions from power plants have been one of the major deterrents to the use of the high-rank, high-sulfur coals of the Midwest and East. Reliable flue gas desulfurization processes that permit burning of these coals without adverse environmental effects are approaching full development and should encourage wide use of coal in electricity generation for the next 25 yr. Estimates indicate that more than 40 sulfur dioxide scrubbing units will be installed on power plants totalling about 20,000 Mw capacity by late 1976. The cost of these units will approach \$750 million. The cost of flue gas desulfurization will be high, ranging from 1.2 to 3.2 mill/kwh. The average increase in electricity cost to consumers is expected to be about 3-6% and in some instances as much as 15%. The added burden may not be as high as that of dependence on foreign oil, both in terms of price and reliability of supply. Combustion of high sulfur coal followed by stack gas cleanup appears to be the most economical alternative for meeting electricity needs in the next few decades. (Author summary modified)

37745

APTIC NO. 61237

Enke, C. G.

DUST COLLECTION SYSTEMS FOR INDUSTRY AND TRADE. (Entstaubungsanlagen fuer Industrie und Handwerk). Text in German. Wasser Luft Betrieb, 18(4):201-207, 1974.

For dust collection in industries and trade cloth filters, centrifugal dust collectors, scrubbers, electrostatic precipitators, and thermal or catalytic afterburners are mostly used. The operating principles of these dust cleaning devices are reviewed. Of the cloth filters, the envelope-type filter is advantageous over the tubular bag-type filter because it uses less space at the same specific load and a simpler rapping device. Cloth filters separate dust particles as small as 0.5 micron. Cyclones separate dust particles to between 15 and 20 micron, of the 2-micron particles, 50% are collected. Among the scrubbers, the Brink liquid mist remover for sulfuric acid plants deserves mention. The filter elements consist of fibers packed into wire mesh cylinders of stainless steel. The SO₃ particles smaller than 1 micron are retained by the new filter elements. Electrostatic precipitators are used for collection of dry particles. For thermal and catalytic afterburning of waste gases, preheating is important so that the heat given off by the cleaned gases in a heat exchanger can be effectively used.

37746

APTIC NO. 61107

Filb, Peter

REGENERABLE SOLID REACTION LAYERS FOR THE PURIFICATION OF HOT, POLLUTED WASTE GASES. (Regenerierbare Feststoff-Reaktionsschichten zur Reinigung heisser schadstoffhaltiger Gase). Text in German. Chem. Eng. Sci., 29(3):721-727, March 1974. 11 refs.

The purification of hot waste gas streams containing high concentrations of sulfur dioxide, hydrochloric acid, and nitrogen oxides by chemical neutralization on continuously regenerated

solid absorbent surfaces was studied in a model experiment. A series of heated metal plates forming a slowly rotating horizontal cylinder that is partly submerged in a tank containing the absorbent solution were used. At a temperature of about 100 C, the solution film entrained by the metal plates is dried in a few seconds to provide a solid reaction surface for the hot gas stream. The reactant film was regenerated 10 times per hour. The purification efficiency of the solid film was similar, and even superior to that of wet scrubbers. Only the reaction of nitrogen oxides with alkaline films was not satisfactory, but it might improve at higher temperature. The efficiency for both SO₂ and HCl reached 99% for initial HCl and SO₂ concentrations of 2500 ppm and 2000 ppm. The effective surface area of the monomolecular layer of reactant is about 10,000 times the area of the metal carrier plates.

37747

APTIC NO. 61462

Fischer, H.

VENTILATING EQUIPMENT IN COMMERCIAL KITCHENS. (Lueftungstechnische Anlagen in gewerblichen Kuechen). Text in German. Heizung Lueftung Haustechnik, 25(2):55-59, Feb. 1974. 6 refs.

Waste air ducts, exhaust hoods, and ventilating ceilings for commercial kitchens are described. Waste air ducts must be installed such that they can be taken out for cleaning or so burning of the deposited matter is feasible. The waste air from kitchens should be discharged into the atmosphere above the highest part of the building to avoid annoyance in the neighborhood by odors. Exhaust hoods draw off the polluted air at the point of origin. They contain filters and a trap collecting the fat. The fundamentals concerning the calculation of the size of exhaust hoods are reviewed. Ventilating ceilings have the best effect with regard to complete withdrawal of all waste air. They are suspended from the concrete ceiling. The constant air movement caused by the ventilator above the suspended ceiling causes a temperature difference between the surface temperature of the ventilating ceiling and the rising warm air, so that all moisture is condensed. The water travels in the U-bar to containers. Through pressure differences within the suspended ceiling, the air is uniformly drawn off across the entire ceiling. Waste air ducts and ventilator of the ventilating ceiling must be cleaned once or twice per year.

37748

APTIC NO. 61596

Friedmann, P. G.

POWER DISPATCH STRATEGIES FOR EMISSION AND ENVIRONMENTAL CONTROL. ISA (Instr. Soc. Am.) Trans., 13(1):1-6, 1974. 10 refs. (Presented at the ISA Power Instrumentation Symposium, 16th International, Chicago, Ill., May 23-25, 1973.)

The application of power dispatch to emission or environmental control by including environmental criteria is discussed. Several possible strategies and resulting dispatch problem structures are presented. Some are designed for control of power plant emissions, others for control of ambient concentrations. Information requirements and computational methods are considered. Five strategies for sulfur dioxide emission control are applied to a model of a typical power system at 85% load. Each one has different effects on system fuel cost, total SO₂ emissions, and SO₂ emissions in the urban portion of the system. One strategy minimizes total emissions but increases urban SO₂ by over 100%. Other more sophisticated strategies allow reduction of total SO₂ while keeping urban emissions within specified limits. (Author abstract modified)

37749

APTIC NO. 61440

Gellersen, E. and P. Reinhold

EXPEDIENT USE OF THE WASTE HEAT OF WASTE GASES WITH A TEMPERATURE OF 800 C WITH THE REGENERATIVE HEAT EXCHANGER. (Sinnvolle Nutzung der Abwaerme 800 C heisser Abgase mit dem Regenerativ- Waermetaecher). Text in German. Energie (Munich), 26(4):143-146, April 1974. 4 refs.

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A regenerative heat exchanger will be preferably used in all cases where a large percentage of the waste heat can be returned to the process, for instance to preheat primary air for combustion. The operation and design of a continuous regenerative heat exchanger for a waste gas temperature of 800 C is described. In the rotary heat exchanger with a vertical axis the heat exchanging elements consist of corrugated steel plates 0.4 to 1.0 mm thick. Depending on the requirements, the elements move one to four times per minute from the hot to the cold gas flow. The fresh air enters on top, the hot waste gases at the bottom. The extent of reduction of the operating costs through regenerative heat recovery is shown by the example of a thermal afterburner. Without heat recovery the operating costs would amount to annually about \$188,000. Through the regenerative heat exchanger a reduction of these costs by more than \$133,000 is achieved.

37750

APTIC NO. 61222

Goda, Hiroshi

AIR TRANSPORTATION SYSTEM OF COLLECTED DUSTS IN FOUNDRIES. (Chuzo kojo ni okeru shujin dasuto no kuki yuso sochi). Text in Japanese. Haikan (Piping), 9(2):44-48, Feb. 1974.

A newly developed air-based dust collector consists of a supplier (which supplies dust to the transportation pipe), transportation pipes and bends, cyclone, bag-filter, moistener, vacuum producer, dust-monitoring apparatus, and silencers. The transportation pipes consist of a part 10 m in height and 67 m long (SGP3B and SGP 31/2B horizontal 86 m and vertical 34 m). A Roots blower produces a vacuum of -5000 mm aq. An electric motor of 65 kw is used. The capacity is 9 cu m/hr. The noise level is 75 phon in the building and 45 phon outside. The capacity of the air conditioner in the blower room is 9000 kcal/hr. The rate of water supply is 45 l/min and the capacity of the water supply tank is 1800 l. The collected dust is automatically mixed with 10-20% water and discharged into trucks. The transportation capacity of the whole system is 850 kg/hr. Special attention was paid in the design of the system to prevent wear in the bends, cyclones, and rotors, and to prevent shelf formation in the transportation systems.

37751

APTIC NO. 61298

Guenther, Rudolf

THE DESIGN OF FLAME AND COMBUSTION CHAMBERS. (Das Entwerfen von Flammen und Feuerraumen). Text in German. Chem.-Ing.-Tech., 46(2):56-62, 1974. 5 refs.

The important task of any design of combustion systems is to match the distribution of the heat-flux densities $q_f(x,y)$ emanated by the flame to the optimal curves of heat intake $q_g(x,y)$ by the material heated. From the numerous shapes of individual flames and their combinations the technically favorable and the same time most economical one must be selected. Selection criteria for the number, shape, size and position of flames, the shape and size of the combustion chambers, counter, cross or unidirectional flow between combustion gases and the material to be heated are discussed. The side effects such as noise, particulate and gas emissions are described. The emission of combustible solids can be limited by control of the firing process. For the formation of the nitrogen oxides in combustion processes the accompanying substance nitrogen and the oxidizing agent are responsible. Experiments concerning the reduction of the NO_x formation have to focus therefore on the combustion processes and thus on the design of combustion chambers. The further development of high-capacity combustion chambers seems to be in doubt now, particularly since it is known that nitrogen stemming from solid and liquid fuels is preferably oxidized. Rules for the design of combustion systems are given.

CONTROL METHODS

37757

37752

APTIC NO. 61230

Haase, Martin

BEWAG POWER PLANT AND REMOTE HEATING PLANT CHARLOTTENBURG. (BEWAG-Heizkraftwerk Charlottenburg). Text in German. Energie (Munich), 26(3):97-108, March 1974. 7 refs.

In the Charlottenburg, West Berlin power plant, three new units have been erected since 1955 with heat utilization of the flue gases from power generation for remote heating. The installed capacity of the power plant is 225 MW. The power storage plant and the three new units are described in detail. For dust cleaning of the three units electrostatic precipitators were installed. To meet the new regulations concerning dust emission, two new electrostatic precipitators were installed in 1969 and 1970. Since the gas turbines were equipped with heat exchangers, heating for 20,000 homes and apartments could be additionally supplied. A stack height for the plant of 80 m was calculated on the basis of the sulfur dioxide background concentration measured in a 5 km radius around the plant. Extra light fuel oil with maximum sulfur content of 0.7%.

37753

APTIC NO. 61315

Hattingen, Ulrich

EXPERIMENTAL DETERMINATION OF THE OPTIMUM FUEL TO AIR RATIO IN OTTO ENGINES. (Versuchstechnische Bestimmung des optimalen Luftverhältnisses fuer Ottomotoren). Text in German. Motortech. Z. (Stuttgart), 35(5):155-156, 1974. 5 refs.

The carburetor adjustment helps to safeguard a certain power at lowest fuel consumption and higher fuel-to-air, ratio which at the same time leads to a reduction of the pollutant emission. The optimum fuel-to-air ratio can be determined by means of the familiar Fischhaken-curves which in turn can be gained with measurement methods which have been satisfactorily applied in industry.

37754

APTIC NO. 60350

Helmer, R.

DEODORIZATION OF ODOROUS WASTE AIR IN GROUND FILTERS. (Desodorisierung von geruchsbelasteter Abluft in Bodenfiltern). Text in German. Gesundh. Ing., 95(1):21-24, 1974.

Ground filters comprise a layer of biologically active soil or compost in which the odorous air from a supply line rises vertically upward. The odorous air is usually drawn off at the point of origin by ventilators and passed directly to the ground filter. The first such filter uses soil as the active layer and cleans sulfide-containing gases from waste water pipes. For waste air treatment in refuse composting plants compost is used for filtering, while waste air from pigpens and chicken manure drying was passed through filter mats packed with compost. For continuous operation of the ground filter a steady state between filtration and regeneration is necessary. The filtering process in the moist soil consists of a sorptive binding mechanism which includes dissolving, adsorption, and ion exchange processes. The spent soil is regenerated by microbial respiration. In some cases chemical oxidation processes may participate. Hydrogen sulfide can be reduced to 10 ppm H₂S in a ground filter which is equal to a complete deodorization. Methyl mercaptan was eliminated to 1.0 mg/kg dry substance/hour.

37755

APTIC NO. 61439

Hofbauer, P. and E. Hoffmann

INFLUENCE OF THE CHARGE MOVEMENT AND THE SHAPE OF THE COMBUSTION CHAMBER ON THE OPERATION OF THE OTTO ENGINE. (Einfluss der Ladungsbewegung und der Brennraumform auf das ottomotorische Arbeitsverfahren). Text in German. Oesterr. Ing.-Z., 17(4):128-137, 1974. 18 refs.

Data is obtained in single cylinder experiments with many different cylinder heads in order to test different charge movements and shapes of combustion chambers. Those obtained with a conventional Volkswagen 1.61 with a cylinder unit having a spherical cavity with and without vortex, one with a cylindrical cavity with and without vortex, and one with a combustion chamber permitting divided combustion are presented. Results obtained at full load and at a typical point at partial load operation were used for evaluation. Of the six different versions, the cylinder unit with spherical cavity and vortex provided the best solution. As compared to the conventional combustion chamber the nitric oxide emissions could be reduced more than 10% and the hydrocarbon emission more than 40% through more turbulent charge movement and changes of the shape of the combustion chamber. The fuel consumption remains the same as with the conventional engine. The method is an economic approach to obtaining a favorable composition of the exhausts for the afterburner.

37756

APTIC NO. 60697

Hoke, R. C., M. S. Nutkis, L. A. Ruth, and H. Shaw

A REGENERATIVE LIMESTONE PROCESS FOR FLUIDIZED-BED COAL COMBUSTION AND DESULFURIZATION. (FINAL REPORT). Esso Research and Engineering Co., Linden, N. J., Environmental Protection Agency Contract CPA 70-19, Program Element 1AB-13, ROAP 21ADB-13, GRUS.14GFGS.74, EPA-650/2-74-001, 109p., Jan. 1974. 13 refs.

The pressurized combustion of coal was investigated in a fluidized bed of limestone and regeneration of sulfated limestone. The work is part of an overall program aimed at developing fluidized bed coal combustion as a means of desulfurizing flue gas in-situ and generating clean power at low cost. The process included regeneration of spent limestone by reduction to lime. This produces a gas stream containing a sufficient concentration of sulfur dioxide to be fed to a by-product recovery unit. The regeneration step was studied at pressure up to 10 atm and temperatures up to 2100 F. The SO₂ concentration measured in the product gas averaged about 2% at 10 atm pressure and 2100 F, about 40% of the concentrations calculated by assuming equilibrium between the solids and regenerating gas. High conversion of sulfated material to lime was achieved by injecting air into the bed, forming adjacent reducing and oxidizing zones, and minimizing formation of undesired calcium sulfide. Combustion studies also began, but the combustion runs were limited by operating problems, especially plugging in the coal injection line. Initial SO₂ removal rates were about 85%. (Author abstract modified)

37757

APTIC NO. 60363

Hotzel, Edmund

HARD COAL MINING AND ENVIRONMENTAL PROTECTION. (Steinkohlenbergbau und Umweltschutz). Text in German. Glueckauf (Essen), 110(2):65-70, 1974. 25 refs.

Strip mining of hard coal creates no major air pollution problems. The dust which is emitted is collected by facilities of the latest-state-of-the-art. Contrary to this coking plants still emit annually about 30,000 t of sulfur dioxide and 26,000 t of dust. Efforts by coking plants reduce emissions of this kind are enormous and amount to about 15 to 20% of the total investments. Great tasks confront this industrial sector as a supplier of solid fuels. The increasingly stringent legal regulations require increasing efforts for reducing the SO₂ emission necessary. The hard coal mining industry as an operator of power plants considers this its task and not that of the government. Efforts are aimed at fuel as well as flue gas desulfurization. While flue gas desulfurization is not yet state-of-the-art and is still expensive, fuel desulfurization is feasible, less expensive, and generally has the same effect on air pollution. For domestic heating, low polluting fuels as well as heaters have been developed which burn smoking fuels with low emission.

37758

APTIC NO. 61436

Huber, E. W. and Manfred Gutmann

HIGH FREQUENCY SCHLIENEN PHOTOGRAPHY ON THE WANKEL ENGINE. (Hoch-frequenz-Schlierenfilmaufnahme am Wankelmotor). Text in German. Motor-*tech. Z.* (Duesseldorf), 35(3):87-90, 1974. 3 refs.

High-speed Schlieren photographs were taken on a Wankel engine to expand knowledge on the mixture preparation in this engine. In a specially designed Wankel engine, the entry of air into the chamber which drew on the expansion and distribution of the liquid fuel in the combustion chamber, the formation of the fuel vapor and the movement of the fuel-air mixture were made visible with the aid of Doppler's Schlieren method. The engine was illuminated by parallel light stemming from a xenon high pressure lamp. For safeguarding an uninterrupted passage of the light through the engine, two Fraunhofer achromats were installed. An illustration of the optical arrangement is given. Some photographs are briefly explained.

37759

APTIC NO. 60412

Iguro, Tatsuyasu

NACHI ENVIRONMENT EQUIPMENT (NO. 1): AIR POLLUTION CONTROL EQUIPMENT SERIES. (NACHI Kankyo sochi (sono 1): Taiki osen boishi sochi shirizu ni tsuite). Text in Japanese. Fujikoshi Giho (Fujikoshi Eng. Rev.), 30(1):27-34, 1974.

Air pollution control equipment developed by American and British firms and manufactured and sold by a Japanese firm are introduced. The characteristics of a bag filter are high efficiency collection of small particulates and a relatively small compressor which achieves effective cleaning. Centrifugal separators collect high concentrations of large particle dusts, and the installation cost is small in proportion to the treatment quantity; a multicyclone with only one movable part of the fan ensures easy maintenance and inspections. The dust scrubber has a simple structure with no movable parts except for the fan, and the dust collection and absorption rates are high; sulfur dioxide and other harmful gases can be removed simultaneously using appropriate chemicals. The venturi scrubber can collect less-than-micron dusts at a high rate; it is highly suitable for large-scale plants.

37760

APTIC NO. 61084

Iinoya, Koichi

SELECTION OF DUST-COLLECTING DEVICES. (Shujin sochi no sentei). Text in Japanese. Preprint, Japan Society of Materials Science, Kyoto, p. 225-238, 1974. (Presented at the Symposium on Pulverization and Dust Control, Kyoto, Japan, Feb. 20-21, 1974.)

The dust emission standard, formerly 1 g/cu m, has been lowered to 0.1 g/cu m and may be again revised to 0.01 g/cu m because of the increasing demand of local residents. Dust collectors able to meet such a stringent standard would be fabric bag filters, electrostatic precipitators, and scrubbers. A cyclone may be used as a preliminary dust collector in addition. Reference data pertinent to various factors of installation and operation costs which may serve as selection guidelines for a dust collector are given. The installation cost of a dry cyclone is 1.35-2 times the purchase cost, with an average figure of 1.5. The installation costs versus the purchase cost of an electrostatic precipitator are 1.4-2, with median cost of 1.7. Similar ratios for bag filters are 1.5-2, with an average of 1.75. The factors affecting the purchase and installation costs are listed. The formulas to estimate an annual running and maintenance cost comprising the costs of power consumption, liquid consumption, fuel and maintenance are discussed. The elements considered in these formulas are the designed capacity, the pressure drop, the electricity fee, the efficiency of the fan, the maintenance cost, the fuel cost, the liquid feed adjustment, the liquid consumption cost, the total power input required to achieve the designated purification efficiency, and

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the wattage of electric power. Performance of each dust collector is also shown comparatively.

37761

APTIC NO. 60424

Ikeda, Makoto

IKEGAI IRON WORKS, KAWAGUCHI FOUNDRY-- FOUNDRY ENDEAVORING TO TURN INTO POLLUTION-FREE WORKS. (Ikegai Tekko (Kabu) Kawaguchi Kojo - Seekyokuteki no kogai taisaku o jissai shita chuzo kojo). Text in Japanese. Imono (Foundry), 46(2):154-158, Feb. 1974.

The Ikegai Ironworks Kawaguchi Foundry holds 200 workers and produces 705 tons per month of regular and special cast iron products of small and large scales. For two cupolas 8 tons/hr and 6 tons/hr, a special bag filter dust collector was designed. The system comprises a double water-cooled duct, air-cooled duct, air-cooled heat emission tower, a fan, an emergency exhaust stack, the secondary duct, a dust collector with 140 bags divided into four chambers, a screw conveyor, and a dust treatment system. The high temperature cupola gas is cooled down to 200 C or less by the double water cooler system, and the lower temperature zone is further cooled by air. A suction duct is connected with the flue and the total gas is drawn in. Incompletely burned carbon monoxide is mixed with the suction air and is burned at the upper part of the hopper. A pilot burner and safety doors are safety devices. The bags are glass fiber and are highly refractory and resistant to chemicals; they remove dusts easily by an automatic knocking system. The fabric is highly anti-corrosive to sulfur trioxide, and no damage has been noted after 1 yr of use. The collected dusts are sent from the hopper by the conveyor to a mixer, mixed with water, and disposed in pellet form. The entire system is enclosed and there is no dust emission. The dust concentration in the stack gas at the exit is 0.02 g/N cu m and is 1/20 of the standard.

37762

APTIC NO. 61582

Ikeda, Minoru

HIGHLY EFFICIENT DUST COLLECTOR. (Koseino shujin sochi ni tsuite). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(3):66-72, March 1974.

Electrostatic precipitators, scrubbers, and filters are discussed. Electrostatic precipitators are efficient in the collection of fine dust particulates from large volumes of gases because of the low pressure drop; they are not suitable for collection of dusts with low electrical resistivity or inflammable gases. Filters cannot be used for viscous or deliquescent dusts, and filter fabrics must be frequently replaced. Scrubbers can be used for the collection of viscous or electrically resistive dusts and treatment of combustible gases. However, it is necessary to dispose of the waste sludge, the temperature of the waste gas is lowered, and the pressure loss is high.

37763

APTIC NO. 61296

Inoue, Ichiro

CONTROL AND MEASUREMENT OF NITROGEN OXIDES. (Chiso sankabutsu no kisei to taisaku). Text in Japanese. PPM (Japan), 5(1): 59-65, Jan. 1974.

The problem of air pollution in Japan started with smoke and dust and changed to sulfur oxides. The problem at present is due to nitrogen oxides. This situation is explained with graphs plotting amounts of pollutants against fiscal years. The emission standard of NOx for boilers is 130 - 480 ppm, heating furnaces 170 - 200 ppm, and nitric acid manufacture facilities 200 ppm. Emission standards for boilers depend on fuels. About 25% of NOx will be reduced by the regulation of these emission standards. A new method of analysis for NOx in exhaust gas based on the phenoldisulfonic acid method will be proposed soon. To reach the environmental standard (0.02 ppm) within 8 years, the pollution source exhausting 300 ppm of NOx must reduce it to 30 ppm. For this purpose, develop-

ment of control techniques, establishment of analytical methods, extension of emission control to other facilities, and regulation by total amounts should be considered. Two-stage combustion and other techniques will improve boilers and may reduce the emission of NO_x to 100 ppm.

37764

APTIC NO. 61211

Juettemann, H.

HEAT PUMPS IN LARGE BUILDINGS. (Waermepumpen in Grossbauten). Text in German. Heizung Luftung Haustechnik, 25(4):124-130, April 1974.

Instead of air conditioning systems required in large buildings, heat pumps can be installed which supply the necessary cool air and at the same time supply heat to such buildings. A suitable heat source for heat pumps is ground water which usually has temperatures around 10°C. Usually a fountain is built from where the water is pumped to the evaporator. In large office buildings, supermarkets, and stores the heat density increases through the more intense illumination and the denser occupation by personnel. Such warm waste air can be combined at several points and the heat can be returned to a heat pump. The costs for a heat pump are generally lower than the costs for a heating system and a separate air conditioning system. Heat pumps which simultaneously supply heat and cold are described as well as systems of small heat pumps.

37765

APTIC NO. 60375

Kertamus, N. J., M. A. Paisley, and W. L. Sage

PROCESS FOR SO₂/CHAR REACTION. Hydrocarbon Process., 53(2): 95-96, Feb. 1974. 3 refs.

The reduction of sulfur dioxide with hot char is examined as a basis for processes capable of disposing of concentrated sulfur dioxide or gasifying char for fuel. Sulfur dioxide can be used as the gasification agent rather than oxygen in coal-synthetic natural gas processes to produce a non-nitrogen diluted carbon monoxide, and the same reaction can be used for reducing SO₂-bearing streams from incinerators for production of elemental sulfur. Tests using differential thermal analysis (DTA) and thermogravimetric analysis (TGA) have established the basic chemistry of the reaction and have shown that carbon is an excellent reductant for pure SO₂ at temperatures around 2200°F and space velocities from 700-800. Rate studies using TGA techniques have shown that 50% of the graphite fed to the reaction is reacted with SO₂ in 15 min at 2300°F and that the reaction rates for char rather than graphite are significantly higher because of its higher specific surface area. The reaction between carbon and SO₂ must be quenched quickly, particularly when using a fixed bed reactor, in order to prevent carbonyl sulfide formation.

37766

APTIC NO. 60404

Kobayashi, Hiroyuki

ON INTRODUCTION AND DEVELOPMENT OF CLOSED SYSTEM. (Kurozudo shisutemu no donyu to kaihatsu ni tsuite). Text in Japanese. Niho No Kagaku To Gijutsu (Japan Sci. Technol.), 15(2):3-10, Feb. 1974.

The need for development and adoption of closed systems for industrial processes is discussed, with reference to closed systems in nature. Closed system development projects being undertaken by national research institutes include: a pollution-free organic synthesis for sulfonation of aromatics that produces no waste acid; an ionization electrostatic plating method that is pollution-free; utilization of pulp waste water; pollution-free pulp manufacturing; and a method of caustic soda manufacture that uses no mercury.

37767

APTIC NO. 61512

Kondo, Yoshitaka

CHECK POINTS ON PLANNING OF DUST COLLECTION. (Shujin keikaku ni okeru mondaiten). Text in Japanese. Kogaku Kojo (Chem. Factory), 18(2):9-16, Feb. 1974. 13 refs.

Variables concerning the selection of the appropriate dust collector for a factory include emission regulations, available facilities, projected reductions, micrometeorology, chemical and physical conditions of the dusts and gases, and costs. Advantages and disadvantages of electrostatic precipitators, bag filters, cyclones, and scrubbers are briefly reviewed.

37768

APTIC NO. 61161

Kubitza, Karl-Heinz, Dieter Leininger, Ferenc Paul Monostory, and Theodor Schieder

RESEARCH AND DEVELOPMENT CONCERNING TREATMENT OF HARD COALS IN THE FEDERAL REPUBLIC OF GERMANY. (Forschung und Entwicklung fuer die Aufbereitung von Steinkohlen in der Bundesrepublik Deutschland). Text in German. Glueckauf (Essen), 110(3):90-96, Feb. 1974. 2 refs.

Research and development concerning flotation, vacuum filtration, careful crushing of coarse nut coal, reduction of the sulfur concentration in coal, and recovery of mining waste are discussed. In many cases desulfurization of coal provides a solution to lowering the sulfur emissions. For coal desulfurization, large amounts of the pyrite must be present in unbound and rather coarse form. The efficiency of sifters, flotation, water cyclones, wet-hearth, magnetic separators, and electrostatic and electrodynamic precipitators was examined. A plant comprising a sifter, a dry pyrite separator, a sludge remover, a settling tank, an impact crusher, a water cyclone, flotation station, a wet-hearth and a dehydration station could reduce the sulfur content of certain coals from 1.35 to 0.97% and the ash content from 25.4 to 7.7%.

37769

APTIC NO. 61356

Kudo, Hiroshi and Takao Hamada

STUDY ON NEW VST AS ABSORBER FOR FLUE GASES. (Hai gasu kyushu sochi to shite no New VST no kenkyu). Text in Japanese. Mitsui Zosen Gihio (Mitsui Tech. Rev.), vol. 85:49-60, Jan. 1974. 7 refs.

The New VST (vertical sieve tray) was investigated as an economical process for removal of sulfur oxides and nitrogen oxides from flue gases. Selection of the absorbing tower which is the nucleus of mechanism of desulfurization processes requires special consideration. The New VST has been well established for the last several years as a good distillation tower, but its application as a gas liquid contacting system is generally overlooked. Systematic experiments were carried out to clarify the correlation of the various factors involved in desulfurization. The results were very unique and more effective than those by conventional absorbing systems. It is recommended that rapid progress be made in the application of the New VST to the field of gas absorption and wet scrubbing, and that a large number of the New VST be adopted for various industrial uses.

37770

APTIC NO. 60373

Kuhlmann, P.

THE STIRLING ENGINE A RATHER NON-POLLUTING AUTOMOBILE DRIVE. (Der Stirlingmotor, ein umweltfreundlicher Fahrzeugantrieb). Text in German. Umschau Wiss. Tech., 74(8):252-253, 1974. 3 refs.

More and more attention is being devoted to the Stirling engine as an alternative power plant. Its noxious exhaust gas emission levels are low, as are its fuel consumption and noise level. On account of its external combustion the Stirling engine requires high-quality heat exchangers. Research, development, and improvement of the Stirling engine are being pursued in Germany by Maschinenfabrik Augsburg Nuernberg AG. and Motoren-Werke Mannheim AG.

37771

APTIC NO. 61432

Lowes, T. M., H. Bartelds, M. P. Heap, and R. Walmsley

INFLUENCING THE OXIDES OF NITROGEN EMISSIONS OF FUEL-FIRED BOILERS AND FURNACES

BY CHANGING THE BURNER PARAMETERS. (Die Beeinflussung der NO_x Emission brennstoffgefeuerter Kessel und Oefen durch Veraendern von Brennparametern). Text in German. Brennstoff-Waerme-Kraft, 26(1):26-31, Jan. 1974. 15 refs.

Two processes contribute to the formation of oxides of nitrogen in furnaces operated with natural fuels, firstly, the oxidation of molecular nitrogen, and secondly, the conversion of nitrogen compounds in fuels. The thermal formation of oxides of nitrogen is limited to the zones of high temperature within the flame. Control of the thermal oxides of nitrogen through suitable burner adjustment seems feasible, since the burner parameters influence the mixing of the fuel with air and the returning gases. The mixing process of these three components influences the flame temperature and the temperature drop of the combustion products. Maximum temperatures are reached when the reaction partners are mixed at a stoichiometric ratio and when neither the fuel nor the air is diluted by returning furnace gases. As a consequence, those burners will produce lower quantities of oxides of nitrogen which draw in higher amounts of combustion products into the flame prior to the actual combustion. Formation of the oxides of nitrogen from nitrogen compounds in the fuel can also be reduced by controlling the mixing process. Through this measure minimum NO_x concentrations can be achieved with natural gas within a wide range of flame types. At pulverized coal flames with high combustion intensity, maximum emissions occur. This is partly also true for oil flames. To a certain extent the nitric oxide emissions of oil flames can be controlled by adjustment of the injection angle and of the position of the fuel injector.

37773

APTIC NO. 61163

Lummer, Richard

AFTERBURNING PLANT FOR PARAFFIN-CONTAINING CUPOLA FURNACE WASTE GASES. (Nachverbrennungsanlage fuer paraffinhaltige Kupolofenabgase). Text in German. Giesserei (Duesseldorf), 61(2):35-36, 1974.

For melting synthetic crude iron in a cold blast cupola furnace, graphite wastes are used instead of coke. The use of these lumpy paraffin- and alkali chloride-containing graphite wastes made the installation of waste gas afterburners necessary. Three burners were installed tangentially into the furnace stack ahead of the dust collector. The burners have to heat about 18000 cu m waste gas per hour from 300 to 400 C to 1000 C. Each burner has a nominal capacity of 360000 kcal/hr. The natural gas consumption for afterburning is 75 to 150 cu m/h. With the burners carbon monoxide and hydrocarbons are burned completely.

37773

APTIC NO. 61489

Masek, Vaclav

FINE DUST MEASUREMENT AT THE WORKING PLACE WITH THE AID OF A MICROCYCLONE AND A FILTER. (Feinstaubmessung am Arbeitsplatz mit Hilfe von Mikrozyklon und Filter). Text in German. Gesundheits-Ingr., 95(5):138-143, 1974. 24 refs.

Comparative measurements between the Czechoslovakian dust analyzer DP 50 and the BAT I used in the Federal Republic of Germany were taken 20 m from a hammer mill for hard coal. The DP 50 is a two-stage dust separator with a microcyclone collecting the particles larger than 5 micron and a filter made of chlorinated polyvinyl chloride to collect fine dusts. The entire analyzer weighs 750 g and the dimensions are 275 mm/45 mm/45 mm. The air throughput is 50 + or - 5 l/min. The BAT I uses a cyclone to separate the coarse dust particles and a membrane filter for collection of the fine respirable dust fraction. The air throughput is 10 cu m/hr, and the weight of the analyzer 9 kg. The results show that the BAT fulfills international standards and is more accurate but also more expensive than the DP 50. The latter is rather inexpensive with a relatively good dust separation. The results of the measurements are listed in tables.

42

37774

APTIC NO. 61660

Matsui, Hiroshi and Genzo Hashizume

SYNTHESIS OF ALPHA TYPE SEMI-WATER GYPSUM IN THE LIME-GYPSUM STACK GAS DESULFURIZATION PROCESS. (Sekai-sekkohai hien datsuryu kotei de no arufa gata hansui sekko no gosei). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 673, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G09.)

The possibility of producing alpha-type semi-liquid gypsum directly in the oxidation process of lime-gypsum stack gas desulfurization system was studied. Materials used were CaSO₃/2H₂O reagent and samples from operative stack gas desulfurization oxidation processes. In an autoclave, 50 g of material and 450 ml water were combined with 2 kg/cu cm air supplied at the speed of 1 l/min, and temperature speed 2 C/min. Under these conditions, slurry pH, reaction time, and heating temperatures were varied, the formation mechanism was analyzed, and x-ray refractions were examined. Oxidation was faster with pH 3 than pH 4. With a reaction time of 2 hr, at above 120 C temperature, alpha-type semi-liquid gypsum was formed and the scanning electron microscope showed needle crystals. Samples from actual desulfurization systems showed that the main mixtures were CaSO₃/2H₂O and Ca(OH)₂CaSO₄·H₂O. When these mixtures were treated under the same conditions described above, a similar result was obtained, and it became clear that an alpha type semi-liquid gypsum can be produced directly in the oxidation process of stack gas desulfurization system.

37775

APTIC NO. 61100

Miazga, Jean

TREATMENT OF DRYING OVEN-GENERATED WASTE GASES. (Traitement des rejets gazeux des etuves). Text in French. Ingrs. Automobile (Paris), no. 2:113-117, Feb. 1974. 28 refs.

The principles of various methods for the treatment of drying oven-generated waste gases, containing primarily solvent vapors and other organic compounds, as well as malodorous substances, are outlined. Condensation, physical or chemical absorption, physical adsorption, chemisorption, as well as thermal and catalytic afterburning are among the common methods for the purification of drying oven-generated waste gases. The malodorous liquid residue obtained after condensation requires further treatment. Activated carbon, possibly containing such catalysts as silver, copper, and zinc, is used chiefly as adsorbent. The most complete elimination of the pollutants is possible by afterburning. Thermal afterburners operate in a temperature range of 750-950 C, and use heat exchangers for preheating the combustion air and the raw waste gas. Catalytic afterburners, using such catalysts as cobalt, nickel, manganese, iron, chromium, and especially platinum, operate in a temperature range of 250-350 C.

37776

APTIC NO. 61091

Mitropol skaya, N. B., N. A. Nikolayev, and V. A. Bulkin

HIGH-CAPACITY ABSORBER FOR THE COMPLEX CLEANING OF GASES. (Absorbtionnyy apparat vysokoy proizvoditel nosti dlya kompleksnoy ochistki gazov). Text in Russian. Khim. Khim. Tekhnol., 17(1):151-153, 1974. 4 refs.

High-capacity, high-efficiency vortex type absorber for gas absorption and particulate retention from industrial waste gases is described. The vertical absorber is composed of a vortex generator in the form of partly overlapping plates, a perforated tube for wash liquid distribution, and liquid collector pockets. The turbulent motion of tangentially admitted gas stream is fortified by the vortex generator, whereby the wash liquid admitted into the contact zone is disintegrated to droplets. The wash liquid is removed from each zone, and fresh liquid is used for every absorber stage so that it is possible to use different wash liquids for the different stages.

37777

APTIC NO. 61142

Mol, Alfred

CENTRAL OR INTEGRATED FLUE GAS WASTE HEAT RECOVERY IN ETHYLENE PLANTS. (Zentrale oder Integrierte Rauchgas-Abwärmeverwertung in Äthylenanlagen). Text in German. Erdoel Kohle Erdgas Petrochem., 27(1):12-17, 1974. 3 refs.

The heat from the stack gases of cracking heaters in ethylene plants can be recovered economically either decentrally from the convection of each individual heater or in a central station fed by a common duct connected to each heater. The pros and cons of the two systems are discussed in terms of thermal efficiency, fuels, feedstock, reliability, environmental conditions, investment, and costs.

37778

APTIC NO. 61488

Monostory, F. P.

SEPARATING WEAKLY MAGNETIC MATERIALS IN HIGH INTENSITY MAGNETIC SEPARATORS. (Trennung schwachmagnetischer Stoffe in Starkfeldscheidern). Text in German. Aufbereitungs Technik, 15(2):86-92, 1974. 9 refs.

With a high-intensity magnetic roller separator having rollers 200 mm wide and 180 mm in diameter, the separation of pyrite from coal was attempted. Untreated pulverized coal and coal which received a preliminary thermal treatment were separated. In the first case, 61.5% of the pyrite could be removed, and in the second case, 90%. A grain size of less than 2 mm proved optimal for the separation. The measurement of the susceptibility of pyrite with a magnetic scale and the increase of the susceptibility by chemical surface treatment with nitric acid, sulfuric acid, hydrogen peroxide, or potassium permanganate, by pyrolysis are discussed. Of the chemical substances, H₂SO₄ yielded the best results. Pyrolysis increased the susceptibility of pyrite significantly.

37779

APTIC NO. 61077

Morimoto, Yoshihide

DUST COLLECTION BY ULTRASONIC WAVES. (Choonpa ni yoru shujin). Text in Japanese. Gijutsu to Kogai (Tech. Pollut.), 4(3):40-43, May 1974.

The purpose of the use of sound waves in dust collection is coagulation of smaller particles into large aggregates of about 10 micron. Cyclones can be used in combination to collect 5-10 micron particles. The advantages of a sound wave collector are: it has no effect on the electric properties of the particles, and it can handle inflammables and explosives. The installation is relatively inexpensive, but the operating cost is higher than that of an electrostatic precipitator. A large compressor is not necessary and the operation cost can be reduced. When the particle concentration is small, the use of sound wave is not possible; but this can be solved by artificially increasing mist concentration. Around the coagulation tower, a sound field of 1-5 KHz/s, 80 phon is created; but this is also solved by the use of an ultrasonic wave siren. The dynamic mechanism of sound waves as dust collector is explained mathematically. A sound wave dust collector can be used with a scrubber in combination with a filter or a cyclone. In all cases, the collection rate will improve. An ultrasonic siren is also effective in eliminating dense fogs on highways.

37780

APTIC NO. 61299

Morita, Naoki

CATALYTIC COMBUSTION-TYPE DEODORIZATION DEVICES. (Shokubai nenashoshiki dasshu sochi ni tsuite). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 3(13):26-35, Jan. 1974.

When designing a catalytic combustion deodorization system, the type and activity of the catalyst, reaction temperature, structure of the catalytic reaction chamber, blower structure, burner structure, and the heat exchanger must be carefully

studied and selected. Catalytic combustion could be very costly when the life of the catalyst is shortened. Platinum catalysts are susceptible to dusts, soot, rust, and mud, and the surface activity is drastically reduced. This can be prevented to some extent by filtering odorous gases, or washing the catalyst. Tar adsorbed on the catalyst is difficult to remove, depending on the reaction temperature. Reduction of chemical adsorption can be caused by precious metals, mercury, lead, tin, arsenic, and zinc. Halogens and sulfur decrease catalytic activity, but when the concentration is less than 10 ppm, the catalyst is not affected. The effectiveness of various catalytic combustion systems for various bad odors, the running costs for catalytic combustion and direct combustion, design criteria, explosion lower limits for bad odor gases and combustion heat, catalytic life, safety measures, noise countermeasures, catalytic exchanges, and heat recovery methods are discussed. The running cost for a traceable amount of amount of odorous gas in the exhaust by catalytic combustion is about \$26/day for the first 2 years, and \$40 after 3 years. The daily operation cost for a direct combustion deodorization system is about \$85.

37781

APTIC NO. 61441

Mortz, Juergen

NEW ON THE EUROPEAN MARKET: LIGHT GAS TURBINES OF THE SECOND GENERATION. (Neu auf dem europäischen Markt: Leichte Gasturbinen der zweiten Generation). Text in German. Energie (Munich), 26(4):140-143, April 1974.

The light gas turbine has been greatly improved over the last years. The improvements include a modular design, low environmental pollution with regard to quantity of emissions and thermal pollution, high reliability of control and regulation, and a simple maintenance service. The waste gas temperatures of these gas turbines are rather high and reach more than 480 C. The waste heat can be used in waste heat boilers. For example a gas turbine has been combined with a steam boiler producing steam of 400 C, 43 atm gauge at a rate of 4.5 kg/kWh. At a condensation of 8:1 the specific total capacity rises from 187 kW/kg air throughput to 265 kW/kg bringing the total efficiency to 37%. Raising the temperature to 1371 C increases the capacity to 538 kW/kg air throughput and the efficiency to 44.6%. If in addition the condensation is increased to the ratio 16:1 which can be realized with the 2nd generation gas turbines the efficiency climbs to 46.2% at an entrance temperature of 1093 C and to 47.6% at an entrance temperature of 1371 C.

37782

APTIC NO. 61322

Motoyoshi, Eiichi and Mayumi Yamada

COMPARISON BETWEEN PRECOMBUSTION AND DIRECT INJECTION IN MEDIUM-SPEED HIGHLY-CHARGED DIESEL ENGINES. (Vergleich zwischen Vor-kammerbauart und direkter Einspritzung bei mittelschnelllaufenden, hochaufgeladenen Dieselmotoren). Text in German. Motortechnik (Stuttgart), 35(1):22-25, 1974.

The differences between diesel engines with precombustion and with direct injection were compared. The tests were performed at various compaction ratios, at maximum pressures of 120 kg force/cm² at continuous operation and at smoke densities of less than 1.0 according to the Bosch-scale. Special attention was given to the starting properties. The results with a Yanmar diesel engine type 6A show that precombustion is superior to direct injection with regard to exhaust gas emission and noise. At long-term operation the emission of oxides of nitrogen was 3.73 g/HPH with precombustion and 4.8 g/HPH with direct injection. Direct injection has advantages with regard to power, fuel consumption, and thermal loading.

37783

APTIC NO. 60710

Mueller, James H.

ENERGY CRISIS COMES TO FUME CONTROL. Text. World, 124(1):58-64, Jan. 1974.

The energy crisis -- availability of fuel and its cost -- has a direct bearing on the problems of fume and odor control in textile finishing plants, because thermal oxidation equipment, currently the most effective method of control, can use large quantities of gas or oil for its operation. Thermal oxidation, also called afterburning or incineration, is used to clean fumes containing oils, solvents, or dozens of combinations. Thermal oxidation equipment includes common afterburners, common afterburners with single-pass heat recovery, common afterburners with dual-pass heat recovery, catalytic afterburners, and regenerative systems. In many cases, industries do not know how to use these methods effectively and may make mistakes in fuel calculations. When evaluating the different types of thermal oxidation equipment, the buyer must analyze actual total costs, including costs which may be hidden. Fuel usage calculations based on the totally unrealistic higher heating value of a fuel may result in a 72% increase in the actual usage for a common afterburner operating at 1500 F. Another misleading method used in fuel calculations is to include in the footnotes that the energy requirements are based on the process exhaust gases containing so much of this or that solvent having such and such an energy content. Instead the purchasers should determine fuel usages based on dry air or dry air equivalent. He should subtract energy available from the process and make the correction for latent and sensible heat losses to give an accurate comparison of what the operating conditions will be and to allow adjustments for future process changes.

37784

APTIC NO. 61239

Muermann, Herbert

AIR FILTERS FOR THE COLLECTION OF FINEST DUST. (Luftfilter fuer Feinststaubung). Text in German. Wasser Luft Betrieb, 18(2):73-79, 1974. 4 refs.

Solid dust particles are divided according to size; coarse dust ranges from 50 to 500 micron and fine dust from 0.5 to 50 micron. Respirable dust has grain sizes between 50 and 10 micron. A diagram showing the size distribution of dust particles indicates that 99.9% of the particles are smaller than 1 micron. The collection of fine dust by fiber filters depends mainly on the diffusion effect, the blocking effect and the forces of inertia. The efficiency of air filters is determined by the pressure loss, the quantity of dust which can be stored, the lifetime, and the collection efficiency. The calculation of the total collection efficiency of air filters is reviewed. To prolong the lifetime of air filters they should be preceded by a duct-type filter (cellular design), a roll-type tape filter, or a long-life filter. The oldest kind of air filter is the envelope-type cloth filter. Air filter cells made of glass fibers combined to a dense felt can achieve high degrees of purity. The operating principle of electrostatic precipitators is reviewed.

37785

APTIC NO. 61523

Murakami, Yuichi

THE ROLE OF CATALYSTS IN POLLUTION CONTROL. (Kogai boshi ni okeru shokubai no yakuwari). Text in Japanese. Japan Society of Chemical Engineering, Proc. Colloq. Present Future Catal. Eng., 33rd, Nagoya, Japan, 1974, p. 1-16. 6 refs. (April 23.)

For air pollution control, the greater the catalyst particle size, the smaller is the pressure loss of the catalytic layer. But the catalytic efficiency decreases due to pore dispersion. To avoid this, the pore structure of catalysts has been reexamined. The traditionally used catalytic layer is packed particles in a spherical or cylindrical reactor. One of the newer designs with the least pressure loss and high contact rate is the honeycomb structure. The optimum catalytic condition is complex with the right reaction temperature, right gas flow speed, and the right gas composition, all of which fluctuate drastically in actual situations. To counter this situation, designing of multi-element catalysts that can cope with the maintenance of activity under any condition is necessary. Also, in using powdered catalysts, control of secondary pollution by scattering must be con-

sidered. Catalysts for hydrogenation desulfurization at present are strictly cobalt-molybdenum-alumina, or nickel-Mo-alumina. For catalytic reduction of nitrogen oxides or degradation of nitric oxide in N₂ and O₂, there is no appropriate catalyst at the present time. The only possibility is the use of reduction of NO to N₂, using methane, propane or other hydrocarbons, carbon monoxide, hydrogen, or ammonia. There is no catalyst other than NH₃ that can react selectively to nitric oxide. The selective reaction of NO-NH₃ is chemically analyzed. Catalytic oxidation of automotive exhaust and catalytic oxidation of bad odors are briefly discussed.

37786

APTIC NO. 61205

Nakai, Yoshiyuki

CLASSIFICATION AND CHOICE OF ODOROUS GAS ELIMINATION APPARATUS. (Kakushu akushu gas jokyō sochi no shurui to sentei). Text in Japanese. Kan-kyo Sozo (Environ. Creation), 4(2):32-39, Feb. 1974.

The wet method is widely used for the treatment of odorous and poisonous gases. There is a problem, however, with the disposal of the washing solution after treatment. The contact oxidation method uses platinum or palladium catalysts, over which organic odorous substances are oxidized and burned at relatively low temperatures. It is necessary in this process to prevent catalyst poisons from entering the apparatus. The adsorption method depends upon the adsorptivity of silica gel, active carbon, alumina gel, and molecular sieves. Oxidation with ozone is often used for the treatment of odorous substances, as is chlorine gas. These methods are not without their drawbacks, however. A method that is especially effective for the treatment of sulfur-containing materials is oxidation with air and the aid of various bacteria. A masking method is sometimes used with the aid of vaniline, heliotropes, and other aromatic compounds. Oxidation with soil is effective for the adsorption of odorous gases. The ion-exchange method is useful for ionic odorous materials. The combustion method is promising but requires further refinements.

37787

APTIC NO. 61135

Noelting, Peter

EXPERIENCES WITH CHLORINE TREATMENT OF ALUMINUM ALLOYS. (Betriebliche Erfahrungen mit der Chlorbehandlung von Aluminiumlegierungen). Text in German. Giesserei (Duesseldorf), 61(1):7-10, 1974.

The effect of chlorine treatment of aluminum alloy melts is discussed and the equipment needed for it described. Refining with chlorine is so versatile and efficient that it cannot be abandoned. However, the equipment can be designed such that all requirements concerning environmental protection are met. Waste gas cleaning facilities have the two-fold tasks of reducing chlorine concentrations to less than 3 mg/cu m and dust concentrations to less than 80 mg/cu m. To solve the first task a scrubber operated with soda lye is required. Packed towers or jet scrubbers are suitable for the purpose. For removal of the finely dispersed dust an additional venturi stage and a ventilator with a high thrust (more than 1000 mm water) is required. For protection against corrosion, rubberizing is most economical. For the entrance to the first stage of the scrubber where the waste gases are cooled to dew point temperature, the more expensive metals (nickel alloys) must be used.

37788

APTIC NO. 61515

Nomura, Tsutomu

DIRECTION TO DESIGN DUST COLLECTOR. (Shujin sochi no sokkei hoshin). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(2): 24-29, Feb. 1974. 2 refs.

Variables in the design and acquisition of a dust collector are the amount of exhaust gas to be treated and its temperature, composition, pressure, and dewpoint at the inlet dust. The

chemical composition, size distribution, and electrical properties of dusts must be evaluated. Appropriate installation areas and countermeasures for secondary pollution such as noise or drainage must be available. Costs must be determined for installation, operation, and possible losses during mechanical failure. The bag filter can be operated continuously regardless of the conditions of the dust and gases. It cannot, however, handle gases with a high temperature, a high water content, and the pressure loss is big. Electrostatic precipitators can be used for gases with high temperatures and water contents. It has a longer lifetime than the bag filter, but cannot handle dusts having extreme degrees of electrical resistivity.

37789

APTIC NO. 61075

Ochi, Akihisa

ON RECENT ELECTROSTATIC PRECIPITATORS AND THEIR PROBLEMS. (Saikin no denki shujin sochi to sono mondaiten ni suite). Text in Japanese. Preprint, Japan Society of Materials Science, Kyoto, p. 210-224, 1974. (Presented at the Symposium on Pulverization and Dust Control, Kyoto, Japan, Feb. 20-21, 1974.)

The problems that have to be solved to improve the dust-collecting efficiency of an electrostatic precipitator so that it is able to remove dust from a gas with a dust concentration below 10 mg/N cu m are discussed. Efficiency is adversely affected when the electrical resistance of the dust exceeds 10,000-10,000,000 ohms/cu. Effects of the gas temperature, water content, and sulfur trioxide on this electrical resistance and the relationship between electrical resistance and the voltage and amperage of the applied power are shown in diagrams. While it is important to adjust the electrical resistance of the dust by adjusting the temperature and moisture, it is equally important to design the electrodes so that the dust deposited on them may be minimized. A powerful hammering system is also important. The spacing between the electrodes was reviewed for improvement of dust-collecting efficiency. The damper-type electrostatic precipitator developed to solve the problem of dust scattering caused by the hammering is fully described. Some operational problems of the electrostatic precipitator are given. Future application of an electrostatic precipitator can be expanded by combining it with a desulfurization system, in which a dry EP is placed before the desulfurizer and a wet EP is placed after the desulfurizer. Hopefully the EP will become applicable to collection of ultra-fine dust particulates in the future.

37790

APTIC NO. 61201

Okamura, Katsuo

MODERN DUST COLLECTORS USED IN CITIES. (Toshi ni okeru saikin no shujin sochi). Text in Japanese. Kuki Chowa to Reito (Air Cond. Refrig.), 14(1):216-222, Jan. 1974.

The nature and the sources of suspended particulates in the air, countermeasures taken against them, and dust collectors and their capacities are discussed. At factories, suspended particulates are suppressed by the adoption of closed systems for conveyors and sieving machines, and also by the charging of powdered material into a reaction chamber, covering the chamber completely, and installing a vent pipe at the opposite end. Boilers, although generally not troublesome in this regard, sometimes emit considerable soot on ignition of heavy oil due to the appearance of a pressure pulse at the moment of ignition. Therefore the cleaning of chimneys is important, as is the installation of hoods on melting furnaces. Popular dust collectors include cyclones, bag filters, scrubbers, and electrostatic precipitators, the operation of which is explained.

37791

APTIC NO. 61518

Okawa, Kow

AFTER-TREATMENT OF DUST COLLECTION. (Shujin no atoshoi to mondaiten). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(2):37-42, Feb. 1974. 14 refs.

Dust recovered from a dust collector can be in the form of loose powders, solid cakes, or wet slurries. During the removal processes secondary pollution can occur if the dusts scatter again or adhere to other surfaces and damage them. Methods to prevent this secondary pollution during maintenance and transportation are particle agglomeration with a liquid binder or dry briquetting.

37792

APTIC NO. 61357

Oomichi, Hideyuki

MITSUMI SO₂ REMOVAL PLANT USING SODIUM HYDROXIDE. (Mitsui sodaho haien datsuryu sochi). Text in Japanese. Mitsui Zosen Giho (Mitsui Tech. Rev.), vol. 85:28-32, Jan. 1974.

The Mitsui sulfur dioxide removal plant which was recently developed by Mitsui Shipbuilding and Engineering Co., Ltd., is described. The plant was designed to remove 95% of SO₂ gas and/or other acidic gases as hydrogen chloride from the gases coming out of boilers, diesel engines, and incinerators of all kinds by using sodium hydroxide. The by-products generated in the plant are sodium sulfite and sodium sulfate. Sodium sulfate can be used as Glauber's salt or discharged as effluent. Three plants have been installed and are successfully operating.

37793

APTIC NO. 61316

Osthaus, K. H.

COAL GASIFICATION BY THE KOPPERS TOTZEK METHOD FOR POWER PLANTS. (Kohlevergasung nach dem Koppers-Totzek-Verfahren fuer den Kraftwerksbetrieb). Text in German. VGB Kraftwerkstechnik, 54(4):221-224, 1974.

With the Koppers Totzek process, pulverized coal with a grain size of less than 0.1 mm is blown by pure oxygen into a reactor to obtain a low-nitrogen tar-free gas consisting of more than 88% of carbon monoxide and hydrogen which is used for the synthesis of ammonia. The process converts 95% of the carbon. The heat of the gas can be used for steam production. For power generation, low-nitrogen gas obtained with pure oxygen seems too costly, however. The price could probably be lowered if the gas were burned in a combustor and the developing flue gases were used for operation of the gas turbines. This method would be highly efficient and very little polluting, provided hydrogen sulfide is removed by a familiar process.

37794

APTIC NO. 60391

Powell, E. M. and R. C. Ulmer

CONTROLLING EMISSIONS FROM FOSSIL-FUELED POWER PLANTS. Combustion, 45(7):24-34, Jan. 1974. 11 refs. (Presented at ENERGY-73, Brussels, Belgium, Sept. 9-16, 1973.)

Approaches currently being taken in the United States for controlling emissions from fossil-fueled power plants are reviewed, and some thoughts on trends of future power generation are presented. Control aspects considered include: coal preparation techniques, oil hydrodesulfurization processes, coal gasification, combustion techniques, specific controls for nitrogen oxides, stack gas cleanup, by-product recovery, and improvement in cycle efficiencies. Tangentially-fired units are currently being designed to meet present NO_x emission standards, and the technology of particular removal by electrostatic collectors is well advanced. Proper selection of hot or cold applications depending on sulfur content accompanied by adequate maintenance has achieved reasonable results. Changing to low sulfur fuels has been to date the only reliable method available to limit sulfur oxides emission. Efforts are also underway to develop stack gas cleanup methods which will have to serve until processes are developed for upgrading or converting coal to low sulfur fuels. Renewed efforts are also underway to improve cycle efficiencies as this would conserve fuel usage and minimize pollutant emissions. (Author summary modified)

Reichelt, Wolfgang and Eckhart Blass

CALCULATION OF PACKED APPARATUS FOR GAS-LIQUID COUNTERFLOW. (Die Berechnung von Füllkörperapparaten bei Gegenstrom von Gas und Flüssigkeit). Text in German. Chem.-Ingr.-Tech., 46(5):171-180, 1974. 35 refs.

Packed apparatuses are employed for sorption, evaporation, and rectification processes. The present state of the art of calculating flow and material exchange processes during gas-liquid counterflow in packed apparatuses is reviewed on the basis of results from the industrial sciences. The applicability of established methods adapted for the calculation, under research conditions, of loading limits and single-phase and two-phase pressure loss, is discussed. The empirical method for the calculation of exchange processes in rectification and the empirical method for calculating sorption and evaporation are described. The necessary empirical equations of the partial gas- and liquid-side mass transfer coefficients and of the moistened packing surface based on volume are tabulated, and their range of validity are discussed.

Roggendorf, M. and Streicher, K.

THE AIR COOLED DEUTZ AUTOMOBILE DIESEL ENGINES F4/6 L913 AND BF 6L 913. (Die luftgekühlten Deutz-Fahrzeug-Dieselmotoren F4/6L913 und BF 6L913). Text in German. Automobiltech. Z. (Stuttgart), 76(1):1-5, 1974. 3 refs.

The new engines F4/6L913 and BF6L913 were developed for vehicles from 6 to 16 tons. They are mainly used in buses and trucks. With the BF6 L913 Deutz developed for the first time a supercharged engine with only slightly more than 6 l stroke volume. Construction and development of the new engines are discussed. The exhaust gas emissions of the new series are far below the standards which became effective in California in 1973. Solutions for meeting the 1976 regulations are presently being considered.

Saito, Masumi

THE KNORCA METHOD - STACK GAS DENITRIFICATION BY CATALYTIC REDUCTION. (Sesshoku kangensho ni yoru haen dassho KNORCA-ho ni tsuite). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 3(3):169-174, March 1974. 1 ref.

The catalytic reduction denitration method developed by the Kurashiki Textile Co. is called KNORCA (Kurabo Nitrogen Oxides Reduction Catalyst), and utilizes ammonia and a specially developed catalyst. The structure is extremely simple and a given amount of ammonia is mixed with flue gas, passed through a catalytic layer at a given temperature. The catalytic layer does not require precious metals such as palladium or platinum. This catalyst at 400 C produces more than 90% of reaction rate for 5000/hr treatment gas. The catalyst sustains its activity even after 1000 hours of operation. A test plant for a combined system for denitration, desulfurization, and gypsum production was constructed for a 5000 N cu m/hr capacity exhaust gas. The flow chart shows one continuous system including denitration and desulfurization process. Ammonia and flue gas are mixed in a static mixer and go into a reaction tower. A dust collector may be necessary before denitration. The gas goes into a preheater and enters a boiler and is burned by a supplementary fuel oil. The gas goes to the pre-cooler condenser (water cooling) goes to the absorption tower and is desulfurized, and goes back to the condenser, and moves onto the oxidation tower. After oxidation, lime is supplied, and gypsum is produced and ammonia water is recovered.

Sato, Atsushi

INVESTIGATION ON AIR CLEANING IN CHC. (CHC ni okeru kuku seijo no kento). Text in Japanese. Kuki Chowa to Reito (Air Cond. Refrig.), 14(2):117-121, Feb. 1974.

Methods for removal of suspended particulates from the air include ventilation, mechanical filters, and electronic air cleaners. In the electronic air cleaner, the larger particles are first removed by a filter. Smaller particulates, which have passed through the filter, are led into an ionizing chamber where they are charged with from 5000-10,000 volts. The ionized particles are then sent into dust collectors, where the particles are adsorbed by electrode plates. The air thus cleaned is sent back into the rooms. Electronic air cleaners (EAC) are classified into portable type, package type, return duct type, and a central heating and cleaning system that holds an EAC inside. The choice of EAC type depends on its intended use. The concentration of ozone formed by an EAC is about 0.005-0.010 ppm, which is well below the specified value of 0.5 ppm. Adequate safety features are included in the design, so that human safety is assured even when the high voltage is touched.

Schuetz, Horst

ADVANTAGEOUS INDIVIDUAL DUST COLLECTION FOR MEDIUM AND SMALL ENTERPRISES. (Vorteilhafte Einzelstaubung fuer Mittel- und Kleinbetriebe). Text in German. Metallwirtsch. Metallmarkt, 28(4):392-398, April 1974.

For small- and medium-sized enterprises individual dust collection has advantages over central dust collection because they have only a few dust sources which are frequently far apart. Individual dust collection is more flexible when new processes are introduced. Sources of air pollutants are primarily soldering and welding processes, pickling baths, and polishing processes. Filtering and electrostatic dust collectors are the most commonly used types because cyclones have an insufficient collection efficiency for respirable dusts and wet collectors return cleaned air with a high moisture content. Filtering dust collectors achieve extremely high collection efficiencies (99.9%) and require little maintenance. The dust particles are retained either by impaction on the fiber or by the blocking effect of the fibers. For the cleaning of dust-containing oil mists dense glass fiber mats are used. The operating principle of electrostatic precipitators is briefly reviewed.

Schwarz, O. and B. Forck

FUEL OR FLUE GAS DESULFURIZATION FROM THE VIEW OF POWER PLANT OPERATORS. (Brennstoff- oder Abgasentschwefelung aus der Sicht des Kraftwerksbetriebes). Text in German. VGB Kraftwerkstechnik, 54(1):10-15, Jan. 1974. 9 refs.

Although a 6 to 40% desulfurization of hard coal is feasible, the gasification of solid fuels is a better (non-polluting) way of using them. With respect to fuel oils, several desulfurization methods are available, all of them based on treatment with hydrogen at high temperatures in the presence of catalysts. Methods are now being developed for the removal of asphaltenes prior to desulfurization. Hydrocracking partly desulfurizes heavy fuel oil and at the same time yields fractions which are easier to desulfurize. Desulfurization to a residual sulfur content of 1% is feasible. Fuel oil desulfurization is at present easier and more economical than stack gas desulfurization, which is not suitable for fluctuating and interrupted operation.

37801

APTIC NO. 61473

Seto, Hiroshi

ODOR REMOVAL BY CATALYTIC OXIDATION. (Shokubai sankaho ni yoru akushu jokyo). Text in Japanese. Kankyo Sozo (Environ. Creation), 4(2):60-63, Feb. 1974.

A catalytic oxidation apparatus for odor removal consists of a heat exchanger, a heater, and a catalytic tower. Offensive gases are introduced into the heat exchanger where the gases are preheated by out-going exhaust gases. The preheated gases are again heated to 200-350 C in the heater and then introduced to the catalytic tower where most of the odors are oxidized. The heat of the out-going exhaust gas is recovered at the heat exchanger. The apparatus requires low fuel consumption and produces no waste liquid due to its dry process. However, metals and chemicals which are poisonous to the catalyst must be removed from the gases before treatment. Results of application of the apparatus at a livestock waste treatment plant with a capacity of 240 N cu m/hr and at a printing factory showed that odors were satisfactorily removed.

37802

APTIC NO. 61080

Shelf, M. and H. S. Gandhi

THE REDUCTION OF NITRIC OXIDE IN AUTOMOBILE EMISSIONS. STABILISATION OF CATALYSTS CONTAINING RUTHENIUM. Platinum Metals Rev., 18(1):2-14, Jan. 1974. 14 refs.

The stabilization of catalysts containing ruthenium for the reduction of nitric oxide in automobile emissions is described. Volatile oxides formed under transient oxidizing conditions in automobile exhaust during operation can severely affect the catalyst. Basic oxides such as alkaline earths or rare earths can stabilize the ruthenium by forming ruthenates which have little tendency to volatilize. Specifically, catalysts stabilized with barium oxide and lanthanum oxide are described. The ruthenates are synthesized either before the catalyst is made or in position on the catalyst support which may be monolithic or pelleted. (Author abstract modified)

37803

APTIC NO. 61584

Shibuya, Sadao and Akira Uchida

FACTORS IN DESIGNING INSIDE-SHOP DUST COLLECTING SYSTEMS. (Tateya shujin sisutemu to sono mondai-ten). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 10(2):129-137, Feb. 1974. 3 refs.

Sources which emit dusty gases must consider adequate upward flow rates to induce dispersion in order to avoid deposition of the dusts around the immediate area. The behavior of dust particles and the air flow characteristics were analyzed by photography and theoretical calculations for a furnace with an air flow of 2-5 m/sec at 10 m. A constant air flow is the easiest to control; if the emissions are variables, and an exhaust system utilizing various types of hoods is effective. The space below the roof can be used as an economical smoke reservoir.

37804

APTIC NO. 61574

Shimoda, Masao

THE ROLE OF LIME IN DEHYDRATION AND DEODORIZATION OF SLUDGE AND TERTIARY TREATMENT OF SEWAGE. (Hedoro no dassui, dasshu to gesui sanji shori ni okeru sekkai no yakuwari). Text in Japanese. Nenryo oyobi Nensho (Fuel and Combustion), 41(4):33-43, April 1974. 7 refs.

Limestone containing 85.8% of calcium oxide was used for hydrogen sulfide removal from sludge. A preliminary experiment was carried out using nitrogen gas containing 250 ppm of H₂S as sample gas. The sample gas was introduced into a limestone packing tower at a flow rate of 1 to 10 cm/sec and with a packing height of 5 to 15 cm and cross section area of 21.7 sq cm. The H₂S concentration could be reduced to almost 0 ppm at a flow rate of less than 5 ppm. Deodorization of

sludge was conducted by mixing 10 kg of sludge with 100 g of limestone in a mixer for 25 min at 50 rpm. The special H₂S odor was removed after 15 min of standing. A review is also given for tertiary treatment of sewage by limestone. The threshold value of phosphorus in drinking water is set at about 0.02 mg/l, while the average value in secondary treated water is about 2.9 mg/l. At a pH value higher than 8, phosphate ions form Ca₅(OH)(PO₄)₃ precipitate in the presence of limestone, by which the phosphorus content of sewage can be removed successfully.

37805

APTIC NO. 60431

Shirasawa, Tadao

COMBUSTION SMOKE AND SOOT CONTROL TECHNIQUES. (Nensho baien boshi gijutsu). Text in Japanese. PPM (Japan), 5(5):39-51, May 1974.

Various kinds of fuel, fuel oil, air required for combustion, combustion chamber heat load, air-fuel ratio, combustion calculation methods, liquid fuel combustion, types of flames, low oxygen combustion, reducing nitrogen oxides, and stack gas desulfurization techniques are discussed. The purpose of low oxygen combustion is the prevention of acid smut. Acid smut is incompletely burned activated carbon soot which adsorbs sulfuric acid in combustion gas and collects ashes and other solid substances, forming large snowflake-like soot. Acid smut clogs the air heater and dust collector, and pollutes the air. Nitrogen oxides are formed by complex conditions depending on the type of fuel, combustion method, and the structure of combustion chamber. In general, high temperatures and high oxygen concentrations increase NO in combustion gas. Control methods include: improvements in burner type and combustion air supply method to prevent local high temperature; part of combustion gas mixed in combustion air and recirculated; combustion improved by a multi-stage furnace; steam or water added during combustion; the heat load in the combustion chamber lowered; and combustion air only slightly preheated. All these methods can lower NO_x in combustion gas to a certain extent, but it can also increase incomplete combustion, decrease heat efficiency, and make combustion conditions unstable. Another method is the use of gas fuel rather than solid or liquid fuel. A large amount of nitrogen contained in the fuel increases the formation of NO_x. The N₂ content is 0.1-0.4% in fuel oil and 0.5-2.5% in coal.

37806

APTIC NO. 61560

Shirasawa, Tadao

HOW POLLUTION CONTROL EQUIPMENT OPERATIONS SHOULD BE TREATED. (Kogai boshi sochi no unten wa do arubeki ka). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(4):10-15, April 1974.

The public attitude toward the question of pollution, the importance of control equipment, emission standards, the performance of control equipment, the operation of equipment, and requests for control administration and management are discussed. The emission standard is questioned. If the industries adhere to the emission standards, this does not necessarily mean that they are free of responsibility. There have been cases in which the emission quantities from individual industries were within regulation standards, and yet the total pollution concentration in the air was well over the standard. Industries are responsible for making efforts in utilizing the best possible control methods, and the administration is responsible for the enforcement of standards and monitoring. The November 1974 orders for industrial pollution control equipment increased 13% over those of October. For air pollution control equipment (which came to more than 50% of the total order), the increase was only 1% and the sum was approximately \$170 million. The cost of pollution control system installations in Japan will soon reach 10% of the total installation cost for production systems. More sophisticated and high performance equipment is constantly demanded. However, rather than depending on control equipment, the operation methods at the emission sources must be examined once again.

Smith, Kenneth D.

APTIC NO. 60893

PARTICULATE EMISSIONS FROM ALFALFA DEHYDRATING PLANTS - CONTROL COSTS AND EFFECTIVENESS. (FINAL REPORT). American Dehydrators Assoc., Mission, Kans., Environmental Protection Agency Grant R801446, Program Element 1AB012, ROAP 21ADJ-83, EPA-650/2-74-007, 122p., Jan. 1974. 7 refs.

NTIS: PB 227448/AS

A field test was carried out to characterize particulate emissions from alfalfa dehydrating plants and to evaluate the cost/effectiveness of available control methods. In 1971, cyclone effluents were sampled to determine mass rates and size distributions of particulates emitted from drying, grinding, and pelletizing operations. Emissions from drying comprised more than 75% of the total emissions, and were the most difficult to control. Dryer emissions varied with process-weight-rate, hay quality, dryer operation, and cyclone collector efficiency. Typically, a 60% reduction in dryer emissions was required to meet the common process-weight-rate standard. In the second testing phase in 1972, benchmark performance data were obtained on two pilot-scale and three full-scale wet scrubbers and on two full-scale control systems which recycle effluent from the primary cyclone. Fractional collection efficiency, gas throughput, pressure drop, and water usage were measured. The medium efficiency wet scrubbers had the potential to bring alfalfa dryer emissions into compliance with process-weight-rate standards, although problems of water clarification and sludge disposal remain to be solved. Partial recycle of primary cyclone effluent back to the dryer furnace reduced particulates substantially and may provide a fuel savings. In 1973, full-scale control devices/systems were tested to determine effectiveness. During source testing of wet collectors, equipment and methods for water treatment and sludge disposal were also studied. Dehydrating plants were operated in compliance with emission standards through plant modifications and operating procedures. Partial recycle of the primary effluent back to the furnace and/or the use of wet scrubbers were effective methods of reducing particulates. Neither recycle systems nor wet scrubbers, however, can bring a grossly dirty plant into compliance if the plant produces excessive smoke as a result of poor operating procedures and/or process controls. Costs are cited. (Author abstract modified)

37808

APTIC NO. 61104

Sommers, Hans, Ludwig Rado, and Lajos Joos

GASEOUS FUELS IN THE SERVICE OF ENVIRONMENTAL PROTECTION. (Gasanwendung im Dienste des Umweltschutzes). Text in German. Gas Wasserfach, gas/erdgas (Munich), 115(2):69-81, Feb. 1974.

The environmental aspects of the use of gaseous fuels are discussed, and regulations imposed on firing equipment in West Germany are criticized. The flue gases from gaseous fuel-fired equipment contain carbon monoxide, nitrogen oxides, possibly hydrogen, and traces of aldehydes, sulfur dioxide, and polycyclic aromatic hydrocarbons such as benzo(a)pyrene. Except for nitrogen oxides, the pollutant emissions from such firing equipment are negligible as compared with those discharged by coal- and oil-fired equipment. Therefore, the strict regulations imposed on coal- and fuel oil-fired equipment in West Germany should not apply to gas-fired equipment. The nitrogen oxides formation, most intensive at temperatures over 1600 C, can be effectively reduced by flue gas recirculation other methods, resulting in reduced combustion chamber temperatures. Increasing the air excess coefficient can also result in reduced nitrogen oxides emissions.

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APTIC NO. 61123

Squires, Arthur M.

CLEAN FUELS FROM COAL GASIFICATION. Science, 184(4134):340-346, April 19, 1974. 36 refs.

Systems that possess immediate commercial credibility for the production of clean fuels from coal gasification as well as markets for clean fuel gases are outlined. Types of processes considered include: gasification in gravitating beds, slagging bed gasification, suspension gasifiers, gasification in fluidized beds, and retrofit of gas-fired boilers to burn power gas. Developmental activities deserving high priority to speed the capture of gas and oil now burned in boilers and to speed realization of the advantages of combined-cycle equipment running on coal are also listed. Potential markets for blown with air- and blown-with oxygen-and-steam-processes include: agriculture, industrial and utility boilers, industrial furnaces, gas turbines and combined cycles, hydrogen production, chemical synthesis, liquid fuel synthesis, and pipeline gas for homes and small businesses.

37810

APTIC NO. 61513

Sugimoto, Mikio

MAINTENANCE OF DUST COLLECTORS. (Toraburu taisaku no tameno hoshu kanri). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(2):30-36, Feb. 1974. 3 refs.

Maintenance of cyclones, bag filters, and electrostatic precipitators is discussed. Problems occurring most often in electrostatic precipitators in cement factories are corrosion or thermal deformation and dust deposition on various parts of the equipment. Bag filters need a lot of maintenance and cannot be used for gases over 300 C. Multicyclones are strongly affected by changes in gas composition, flow rates, and temperature.

37811

APTIC NO. 60407

Takemura, Eiji, Yoshimichi Mizobuchi, and Hideyuki Takahama

COOLING DEVICE FOR WASTE GAS OF PURE OXYGEN UP-BLOW CONVERTER. (Junsanso uwabuki tenro no haigasu reikyaku sochi). Text in Japanese. (Nippon Steel Corp., Tokyo (Japan)) Japan. Pat. Sho 49-8762. 5p., Feb. 28, 1974. (Appl. Sept. 17, 1966, 1 claim).

A new design for a cooling system for converter furnace waste gases that increases the efficiency of dust collection is described. A square duct of multi-section construction is provided, each section consisting of four water-cooling wall plates. Water falls along the outside surface of each wall plate, cooling the waste gas flowing up from the dust.

37812

APTIC NO. 61117

Teoke, Geza

REDUCTION OF AIR POLLUTION BY THE HYDROCARBON PROGRAM. (A szénhidrogén-program megvalósítása csökkenti a levegőszennyezést). Text in Hungarian. Energia Atomtech. (Budapest), 27(1):3-8, 1974. 15 refs.

The impact of the hydrocarbon program, started a few years ago in Hungary to increasingly replace solid fuels by liquid hydrocarbons and natural gas, on air pollution is outlined. The shares of coal is expected to fall from 72.4% to 27%, and that of hydrocarbons to rise from 21.2% to 66% during the 1960-1980 period. The share of natural gas will reach 21% by 1975 when at least 65% of all households will have natural gas. Hydrocarbons form water vapor, carbon dioxide, carbon monoxide, sulfur dioxide, nitrogen oxides, soot, and ash when incinerated. The CO and soot emissions can be abated by improving the quality of combustion, while the SO₂ concentrations at ground level can be best abated by the use of high stacks. Fuel desulfurization is regarded as costly, while flue gas desulfurization is still in the stage of development. An ex-

perimental process developed in Japan reduced the SO₂ emission by 90%, and the nitrogen oxide emission by practically 100% by sending the flue gases through a space exposed to electron radiation for subsequent separation in dust separators. Natural gas, containing practically no sulfur, generates practically no air pollutants during its combustion. With the depletion of the hydrocarbon resources, new sources of energy, such as nuclear fuels; breeder reactors, thermonuclear fusion, magnetohydrodynamic energy conversion, but also the underground gasification of vast coal resources, will be increasingly needed.

37813

APTIC NO. 61225

Terada, Hiroshi

REMOVAL OF ODORS BY THE ADSORPTION WITH ACTIVE CARBON. (Kasseitan kyuchaku-ho ni yoru akushu no jokyō). Text in Japanese. Kankyo Sozo (Environ. Creation), 4(2):64-72, Feb. 1974. 8 refs.

Methods for deodorization by active carbon, and the design of odor elimination apparatus with active carbon are reviewed. Active carbon contains both micropores 10-100 Å in diameter and macropores 100 Å to 10 microns in diameter, as well as a large specific surface area. Active carbon is hydrophobic and adsorbs various gases in the presence of water, whereas other adsorbents are hydrophilic and preferentially adsorb polar components. The heat of adsorption is about 1.2-1.4 times that of condensation heat, and is mostly exothermic. Regeneration of active carbon is made by purging with air, steaming, extraction with chemicals, or calcination. Active carbon shows adsorptivity for a wide variety of odorous substances as a result of both chemical and physical adsorption. Monitoring is unnecessary during the adsorption. Active carbon is used for deodorization either singly or in combination with the absorption method. Typical examples of application of active carbon to deodorization in Japan are the treatment of odorous gases from sewage disposal and chemical plants, (for example, the treatment of waste water discharged from ethylene plants and the gases discharged from protein decomposition plants).

37814

APTIC NO. 61469

Tono, Koji

DEODORIZATION BY DIRECT GAS COMBUSTION. (Gasu-daki chokusetsu nensho ni yoru akushu jokyō). Text in Japanese. Kankyo Sozo (Environ. Creation), 4(2):50-55, Feb. 1974.

The standard deodorization furnace manufactured by the Osaka Gas Co. is described. Odorous gas enters the unit from the upper wall and is heated by the adjoining wall of the combustion chamber. The odorous gas enters the combustion chamber through small holes at the bottom of the chamber, and mixes with fuel gas coming out of the burner. Combustion air is not specially supplied, but oxygen in odor gas is used; therefore, the oxygen concentration in odorous gas must be more than 18 vol%. The furnace is suitable for organic compounds, but odorous gas containing halogen, nitrogen, and sulfur are not suitable for this type of direct furnace. Odorous gases most successfully deodorized are organic solvents, oil, fat, plastic agents, coffee roasting odor, and exhaust gases from kilns and dryers. In designing a combustion deodorizer, the following factors must be examined prior to the selection of specifications: odor components and concentration (maximum and minimum limits); odorous gas quantity and temperature; water content, oxygen concentration and its fluctuation; gas heat after deodorization and its use; and location. The economical use of a combustion deodorizer, energy calculation methods, exhaust energy recovery method, safety measures, and the pipe system are discussed.

37815

APTIC NO. 61227

Trenkler, Harro

THOUGHTS ON ENVIRONMENTAL PROTECTION. (Gedanken zum Umweltschutz). Text in German. Elektrizitätswirtschaft, 73(1):1-2, Jan. 1974.

The efforts for environmental protection, though needed, are sometimes overzealous. It is wrong to demand the reduction of anthropogenic emissions to a limit value of close to zero. For instance, the considerable reduction of dust and sulfur dioxide emissions in industrial areas has now become the basis for new reductions. The flue gas desulfurization demanded for large power plants is not yet fully developed. Wet cooling towers shall be outlawed by 1980, although the percentage of water evaporated by this type of cooling is very small. Agriculture requires much more water for artificial irrigation than cooling towers. The costs for environmental protection measures demanded from thermal power plants such as desulfurization, noise abatement, dry cooling towers, and improved dust collection amount to a total of about \$100/Kw which raises the costs for power plants by 40%. It is more in the public interest to take protective measures which achieve the greatest effect at a minimum of expenditures.

37816

APTIC NO. 61534

Tsuruta, Hidemasa

METHOD TO REMOVE AMMONIA CONTENT OF COKE OVEN GAS. (Kokusuro gasu-chu no ammoniya-bun jokyō). Text in Japanese. (Nittetsu Kakoki Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 49-11241. 4p., March 15, 1974. (Appl. June 18, 1970, 1 claim).

The conventional deammoniation process in which sulfuric acid is used to remove the ammonia content from coke oven gas and produce ammonium sulfate as the by-product is becoming less practical due to the recent change in the chemical fertilizer market and the high cost of sulfuric acid. In a new deammoniation process, the ammonia content of the gas is recovered as a gas chiefly composed of ammonia by adsorption and distillation. The gas is then incinerated, using the specially designed burner. Heat generated by the incineration can be utilized to produce steam if desired. This process discards the production of ammonium sulfate in favor of cost reduction. The ammonia content of coke oven gas is absorbed by water in the absorption tower. The steam composed of ammonia and the water content evaporated in the distillation tower is removed. Part of the steam is condensed and recirculated into the distillation tower while the remainder is recovered as ammonia gas containing ammonia at 60% volume. The recovered ammonia gas is then incinerated at the excess air ratio of 1.1.

37817

APTIC NO. 61678

Usui, Kazuo

THE OPERATION, MAINTENANCE, AND MANAGEMENT OF AIR POLLUTION CONTROL EQUIPMENT. (Taiki osen boshi sochi no unten hoshu kanri). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(4):16-20, April 1974.

Important pointers for the operation, maintenance, and management of air pollution control equipment are given. First, the thorough knowledge of the equipment and its functions is important. Inspection of hoods and dusts for wear and corrosion are important. The use of a pre-duster will make a great difference in the performance and life of the equipment. The use of a pre-duster is especially important for a stack gas desulfurization system, since dusts will cause loss of pressure, clogging of activated carbon pores, and other damages to the absorption tower. A careful and frequent inspection of relatively simple equipment such as inertial and centrifugal dust collectors is important. These collectors utilize high speed air flow and often scatter the collected dusts. For bag filters, a large part of maintenance cost comes from the filter fabric damages. Imperfectly removed dusts will cause clogging and pressure loss; and on the other hand, too much shaking and brushing will wear fabric. The determination of optimum frequency and degree of dust shaking is difficult and repeated adjustments over a long period of observation will be necessary. The effects of the high temperature on fabric must be also studied. The use of scrubbers, electrostatic precipitators, and

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fans also require correct operation, inspection, and maintenance.

37818

Uwakawa, Sumi

APTIC NO. 61199

GASOLINE VAPOR RECOVERY APPARATUS. (Gasorin joki kaishu sochi ni tsuite). Text in Japanese. Kankyo Sozo (Environ. Creation), 4(2):85-92, Feb. 1974.

Various apparatuses for the recovery of gasoline lost during refilling or transfer are described. The Vaportrol apparatus channels vapor discharged from a tank being filled into another storage tank in a gasoline station. The excess vapor can be cooled to give liquid gasoline. Another system is the Vaporex Unit, for use at petroleum refineries. It can treat 100-600 N cu m of gasoline vapor per hour, with an efficiency of recovery of 97%. Power consumption is 150 kw, and methanol consumption is 100 kg/mo. For 150,000 kl gasoline treated the unit provides an income of \$100,000 and the cost of construction can thus be made up in 3.9 yr. There is a need, however, for the development of accessories to this unit to make it more usable.

37819

Vogeno, Walter

APTIC NO. 61318

NOVEL THERMAL TWO-STAGE PROCESS SOLVES INDUSTRIAL WASTE SLUDGE PROBLEMS. (Neues thermisches Zweistufen-Verfahren loest industrielle Abfallschlamm-Probleme). Text in German. Energie Tech., 26(2):42-43, 1974.

A new method for thermal treatment of industrial as well as other waste sludges is described. Two versions of this method exist, one serves for treatment of sludges with a high water content, the other for largely dewatered sludges. The wet sludge is first preheated for which the waste gases from the sludge incineration in the story furnace are used. The preheated sludge is then pumped to the drum dryer. A rotary atomizer divides the sludge into finest particles which are injected into the hot gas flowing in the same direction through the dryer. In the story furnace the preliminarily dried sludge is incinerated at temperatures between 850 and 1000 C. Through this high temperature the vapors from incineration are entirely deodorized. The largest volume fraction of the hot furnace gases is used for the drying process in the drum. The remaining fraction serves for preheating the combustion air as well as for heating the fresh sludge. After adequate dust removal, the waste gases then leave the system. Sludges with a water content of 70% are mixed with dry dust from the cyclone and dried at 850 C in a Humboldt rapid dryer. A cyclone cleans the waste gases from dust. The cleaned waste gases then return to the furnace for reheating and use in the dryer.

37820

Vogeno, Walter

APTIC NO. 61438

UNPROBLEMATIC SEWAGE SLUDGE TREATMENT BY A NEW THERMAL TWO-STEP PROCESS. (Problemlose Klärschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren). Text in German. Papier Darmstadt, 28(5):209-210, 1974.

A new sewage sludge treatment process is described which is suitable for every kind of sludge composition. Two versions of this process were developed, the first one serves for sludges with high moisture content, the second one for sludges with a high solids content. In the first case the sludge is pumped to the preheater where waste heat is used to preheat the sludge. After preheating, the sludge is pressed into the drying drum, where it is atomized and injected into the hot gas entering in the same direction as the sludge. The dried sludge is incinerated in a story furnace. The gas coming from the incinerator has a temperature of 850 to 1000 C which guarantees complete deodorization. Most of this gas is used for preheating the sludge, the remainder serves for preheating the combustion

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air. After being cleaned from dust the gas is discharged. In the second version sludge with a moisture concentration of 70% is mixed with dust from the cyclone and dried in a Humboldt dryer. The drying process is terminated in the cyclone where the flue gas is separated from the solid matter. Part of the separated matter is returned to the mixer for addition to the fresh sludge, the rest is either incinerated, used for soil improvement, or used for covering deposited trash.

37821

Vollhardt, Frohmut

APTIC NO. 60415

WASTE HEAT BOILERS FOR POWER GENERATION IN PLANTS FOR ENVIRONMENTAL PROTECTION. (Abhitzanlagen als Energieerzeuger in Umweltschutzanlagen). Text in German. Energie Tech., 26(3):69-73, 1974.

Three waste heat boiler/incinerator arrangements are described. The first incinerator burns sulfuric acid paint exhausted from manufacture and the manufacture of synthetic fibers. The waste acid is sprayed into an oil or gas flame and cracked to sulfur dioxide at temperatures between 1100 and 1200 C. The waste gas from this process is cooled to 330 C in a waste heat boiler where steam for power production is produced. The main problem which the construction of the waste heat boiler must take into account is corrosion. The design of the boiler which reduces corrosion to a minimum is described in detail. In a rotary kiln for the incineration of liquids such as solvents and sewage sludge, pasty and solid wastes are fed into the kiln discontinuously. Therefore the boiler construction faces, apart from corrosion, the problem of being elastic to load changes. This can only be solved by a forced circulation boiler. The third plant described serves the incineration of waste oils, resins and pigments, and similar substances. A central combustion chamber lined with ceramic fire-proof stones is equipped with a front-side burner. Incineration takes place at a temperature of 1100 C. In this case the waste heat boiler can be shut off if the heat is not needed. The waste gases are then cooled by injecting cold air into the waste gas flow.

37822

Wanner, P.

APTIC NO. 61294

MELTING PLANT WITH LOW FREQUENCY CRUCIBLE FURNACE AND SCRAP PREHEATING IN A FOUNDRY. (Schmelzanlage mit Niederfrequenz-Tiegelöfen und Schrottvorwärmung in einer Kundengießerei). Text in German. Giessereipraxis, 25(6):101-105, March 1974.

A low-frequency crucible furnace with scrap preheating for melting of cast iron is described. Through integration of the sorting and charging devices as well as of the preheater into a central control system a remarkable degree of mechanization and automation could be achieved. The plant operates with a minimum of personnel and emissions. Waste gases are drawn off at three points in the plant, at the tumbler (20,000 cu m/hr), at the preheater (25,000 cu m/hr), and at the furnace (40,000 cu m/hr). Tumbler waste air and off-gases from preheating are cleaned in wet filters to a residual dust concentration of 50 mg/cu m. The waste air from the furnace is cleaned in a bag filter to a residual dust concentration of 25 mg/cu m.

37823

Warnecke, A.

APTIC NO. 61314

SOLUTION TO PROBLEMS OF DUST COLLECTION WITH THE AID OF RING-JET FILTERS, TYPE PRF. (Die Lösung von Entstaubungsproblemen mittels Ring-Jet-Filter, Typ PRF). Text in German. Aufbereitungs-Technik, 15(4):201-204, 1974.

The ring-jet cloth filter type PRF is described. It comprises 60, 80, 100, 120, or 140 tubular bags in a casing. The filter bags are pulled over supporting structures. The filters, 10 at a time, are cleaned by reverse air jets. The specific load per sq m

filter area may amount to between 2 to 10 cu m/min. They operate with gas temperatures between minus 30 to plus 100 C. The filter tube resistance is 80 to 100 mm. Through various combinations of individual units, filtering systems with a capacity up to 200,000 cu m/hr can be erected. The described filter is in operation in the chemical industry, the cement industry, the wood industry, and the food industry. With the filter, residual dust concentrations of less than 10 mg/cu m can be achieved.

37824

APTIC NO. 61451

Watanabe, Haruo

DUST CONTROL IN BOARD MILLS. (Bodo kojo no fun-jin boshi). Text in Japanese. Kami-Pa Gikyoshi (J. Japanese Tech. Assoc. Pulp Paper Ind.), 28(2):76-83, Feb. 1974. 3 refs.

Dust emission sources in a board mill include the boiler, the combustion furnace, the combustion yard, the dump car, the storage yard, the dryer, and the grinder. The boiler and combustion furnace can produce as much as 9 to 45 kg/hr dust, and the dryer as much as 32 to 136 kg/hr. Most of the dusts from the dryer are larger than 20 micron (72-88%). Dust collection at board mills is usually conducted by a combination of cyclone and bag filter or scrubber. Dust-containing air is introduced into the cyclone through a fan where a by-pass diverts the air direction when necessary. Larger particles are separated in the cyclone and the resulting air is introduced into a bag filter or a scrubber where small particles are separated from the air. The advantages of using scrubbers are that there are no moving parts in the apparatus, no filter is required, there is no danger of fire, and it provides high efficiency. Disadvantages are the extra fan, and pretreatment of slurry or sludge.

37825

APTIC NO. 61398

Watermann, W. W.

SURVEY OVER THE TECHNOLOGY OF COAL CONVERSION - A SUMMARIZING PRESENTATION. (Uebersicht ueber die Technik der Kohleumwandlung - Zusammenfassende Darstellung). Text in German. Energie Tech., 26(4):99-103, 1974.

Desulfurization of coal can be accomplished by gasification, thermal cracking, and liquefaction. The gasification method can be divided into single, two- or multi-step processes, or special processes. The Atgas method is based on the entry of pulverized coal, oxygen, steam, and hydrogen into an iron melt supporting a layer of lime and slag. The carbonizing reaction converts the solid carbon into oxidizable form and the molten slag binds sulfur and ash components. Pyrolytical processes use the volatile components of coal rather than the solid carbon. The coal is heated to 1000 F, the volatile components are driven off, condensed, cracked, and then refined. Through liquefaction with the aid of H₂, low-sulfur fuels can be obtained. Five liquefaction processes are listed in a table.

37826

APTIC NO. 60352

Wurr, Konrad

STATE-OF-THE-ART OF REMOTE HEAT SUPPLY. (Zum Stand der Fernwaermeversorgung). Text in German. Energie Tech., 26(3):58-60, 1974. 8 refs.

Remote heating has the advantages that combustion takes place in highly developed and automatically controlled firing systems with high efficiency, the emission of ash and unburned fuels can be limited by means of efficient filters, a large number of individual stacks can be replaced by one high stack and a switch to other kinds of fuels is easier. The utilization of waste heat from incinerators and (if certain conditions are met) from nuclear power plants is feasible. At present 21.2% of the heat demand is covered by remote heat. Heat taken from a power plant is less costly than central heating systems of buildings or remote heating plants. This is true only

for power plants in or near urban conglomerations. For the large number of power plants outside urban areas the heat would have to be stored between April and October. A hot water lake has been proposed for this purpose, sealed by a plastic foil against evaporation and by 25 cm thick foam boards against heat losses.

37827

APTIC NO. 61171

Yamagishi, Kazuo, Masaaki Nozawa, Teruichi Yoshie, Tsunenori Tokumoto, and Yasuo Kakekawa

STUDIES ON A LOW NOX COMBUSTION METHOD. (Tei NOx nenshoho no kenkyu). Text in Japanese. Nihon Kikai Gakkai-shi (J. Japan. Soc. Mech. Eng.), 77(663):99-106, Feb. 1974. 11 refs.

A newly developed combustion method which produces minimal amounts of nitrogen oxides is introduced. Combustion is divided into two stages, but it is different from the previous methods in that the air ratio from the primary combustion is kept to the minimum limit. This partial combustion gas goes through a catalyst layer and enters the second combustion chamber at high temperature. The gas is completely burned in this chamber. The amount of NOx is independently and separately controlled at the first and second stages of combustion, and the entropy of high temperature combustion at the second stage can be utilized for correction of flame condition to a desirable form and temperature. For this, a sampling probe thermocouple is installed at the gas entrance and the exit of the second chamber and a cooling water chamber surrounds the chamber. To solve the problem of maintaining combustion and flame at a low temperature in the first chamber, the first chamber is insulated and a high speed burner which burns at a low air ratio was designed. Experiments were conducted successfully using a model, and the results are presented with mathematical formulas, graphs, diagrams, and tables. A burner usable in actual situations is now under development.

37828

APTIC NO. 61571

Yamashita, Hisao, Shoji Kubota, Yusaku Nishimura, and Fumito Nakajima

AUTOMOBILE NOX REDUCTION CATALYSTS (NO. 1): ACTIVITY OF PRECIOUS METAL WITH ALUMINA CARRIER AND METAL OXIDES CATALYSTS. (Jidosha NOx kangen shokubai (daiippo), arumina tantait-suki kikin-zoku oyobi kin-zoku sankabutsu shokubai no kassei). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 668, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G04.)

Reduction of nitrogen oxides in engine exhaust gas was examined using precious metal catalysts with alumina carriers and metal oxides catalysts. The composition of exhaust gas was 3000 ppm of nitric oxide, 2-3% of carbon monoxide, 400-600 ppm of hydrocarbons, and 0.8-1.2% of ozone. The reduction rates of various catalysts and catalytic temperatures were examined at SV30,000/hr. Concentrations of NO, CO, and HC were analyzed by nondispersive infrared analyzer, and NH₃ formation was measured by neutral titration. Precious metals (platinum, palladium, and ruthenium) had much better activities than metal oxides. The rate of NH₃ formation was smallest with Ru, but the best activity was obtained by the combination of Ru and Pd. For NO reduction, the Ru-Pd catalyst are used, and for CO and HC oxidation, the Pd-Cr catalyst. Purification of the exhaust gas and NH₃ formation were measured. The NO reduction rate was much better when the NO reduction catalyst only was used, rather than when it was used after the oxidation reaction. The rate of decrease in exhaust cleaning rate as a result of oxidation process agreed with the ratio of NH₃ formation.

37829

Yanagase, Tsutomu

APTIC NO. 61228

POLLUTION CONTROL MEASURES IN NON-FERROUS METAL SMELTING. (Hitetsu seiren ni okeru kogai taisaku). Text in Japanese. Nippon Kinzoku Gakkai Kaiho (Bull. Japan Inst. Met.), 13(3):185-191, March 1974. 15 refs.

Disposal of the smelting exhaust gas is the main pollution control problem in the non-ferrous metal industry, especially copper smelting. The recent introduction of the flash smelting process has ameliorated the problem, especially with respect to sulfur dioxide. Although a number of wet and dry processes have been introduced, the most popular gas desulfurization processes currently are the sodium hydroxide absorption method, the lime stone method, and the zinc oxide method. In the copper smelting industry, about three tons of sulfuric acid can be produced per ton of copper produced. Considering the storage capacity for this by-product, the best method to recover sulfur content from the smelting gas may be the one that recovers it in the form of pure sulfur. When recovered as such, it is easier to store and can be easily reduced to sulfuric acid whenever necessary. In this connection, the Autokompu process is introduced. Disposal of dust, waste water, and smelting slag are also briefly discussed. The new non-ferrous metal smelting method suggested by C. L. Milliken is also described.

37830

APTIC NO. 61545

Yokoyama, Yoshio and Gihei Imano

METHOD FOR SEPARATING HYDROGEN SULFIDE OR SULFUR DIOXIDE FROM CARBON DIOXIDE. (Nisanka tanso to ryukasuiso aruiwa nisanikaiwo to no bunriho). Text in Japanese. (Idemitsu Kosan Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 49-5112. 3p., Feb. 5, 1974. (Appl. Sept. 18, 1969, 1 claim).

To separate hydrogen sulfide or sulfur dioxide from carbon dioxide, the partial pressure of carbon dioxide contained in a mixture of the gases is arranged in advance to be below one atmospheric pressure. The mixture of gases from which hydrogen sulfide or sulfur dioxide is to be separated is placed in contact with a saturated water solution of hydroquinone, so that the hydrogen sulfide or sulfur dioxide may be absorbed to the hydroquinone for separation from the carbon dioxide. The hydroquinone-hydrogen sulfide or sulfur dioxide compound is then heated together with the hydroquinone water solution, thereby carrying out decomposition into hydroquinone and hydrogen sulfide or sulfur dioxide. The saturated water solution of hydroquinone suspension is then circulated for reuse.

37831

APTIC NO. 61573

Yoshizumi, Kunio and Toshio Ohira

PROPERTY CHANGES IN AUTOMOTIVE EXHAUST GAS TREATMENT CATALYSTS. (Jidosha haiki gasu shori shokubai no bussei henka). Text in Japanese. Tokyo Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol 5:51-55. March 1974. 9 refs.

Property changes of a commercial catalyst used in a 4-cycle, 4-cylinder, 1600 cc domestic car (mileage 20,000 km), after 3000 km at running conditions. The exhaust gases were analyzed by a MEXA-18 S analyzer, and the catalyst was analyzed by x-ray diffraction, x-ray fluorescence, thermal differential analysis, and a sclerometer. The carbon monoxide and hydrocarbon purification efficiencies at idling and 60 km/hr at 0 km of running distance were 89% and 90%, and 66% and 55%, respectively; those at idling speeds and 60 km/hr after 3000 km of running distance were 28% and 7%, and 11% and 8%, respectively. The initial packing of 2000 g of the catalyst was reduced to 640 g after 3000 km. The compression strength of the catalyst was reduced 75% and the specific surface from 120 to 51 sq m/g. X-ray diffraction showed that the major components of the catalyst were cupric oxide-alu-

mina with traces of iron and chromium. The formation of CuAl_2O_4 proceeded as the catalytic reaction took place.

37832

APTIC NO. 60426

Sumitomo Metal Industries, Co., Ltd. (Japan)

COMPLETION OF THE MORETANA-TYPE STACK GAS DESULFURIZATION-DENITRIZATION SYSTEM. (Moretana-shiki haien datsuryu dassho sochi no kansei). Text in Japanese. Gijutsu to Kogai (Tech. Pollut.), 4(3):102-103, May 1974.

A new porous multi-shelved stack gas desulfurization-denitrization scrubber was developed and completed in May 1974. This scrubber achieves simultaneous desulfurization and denitrization with high efficiency. Further tests will be given for 1000 hr continuously to confirm its efficiency. The capacity of the system is 62,000 N cu m/hr, and the scrubber oxidizes nitric oxide into nitrogen dioxide by wet oxidation, and caustic soda absorbs SO_2 and NO_2 . The system consists of a boiler, flue gas cooler, a dust eliminator, the oxidation process, an absorption tower with porous shelves, a liquid-gas separator, an afterburner, and a stack. The combustion gas enters the tower from the lower end while a caustic soda absorbent streams down through the pores of a number of shelves, and effective gas-liquid contact and desulfurization and denitrization are achieved. The desulfurization rate is 99.5%, and denitrization rate is expected to be about 95%.

37833

APTIC NO. 60440

Kyushu Electric Power Co. (Japan)

POWER COMPANIES PROGRAMS FOR ENVIRONMENTAL PROTECTION-THE PRESENT CONDITION AND COUNTERMEASURES. NO. 9: KYUSHU ELECTRIC POWER COMPANY. (Kankyo hozen ni torikumu denryoku kankusha-genjo to taisaku-sono 9: Kyushu Denryoku Kabushiki Kaisha). Text in Japanese. Denki Kyokai Zasshi (J. Japan. Electric Assoc.), no. 605:15-39, March 1974.

The administrative policy and programs for environmental protection by the Kyushu Electric Power Company are discussed. For sulfur oxides emission control, the combustion equipment of all power plants have been remodeled for low sulfur fuel oil consumption, and stacks have been replaced. For newly constructed plants, collective high stacks of 180-200 m are being installed. The average sulfur content in fuel oil was 2% in 1970, 1.7% in 1972, and 1.4% in 1973. This will improve to about 0.5% by 1977, depending on the progress of desulfurization techniques of fuel oil and general environmental conditions. Liquid natural gas is also in the plan. A new stack gas desulfurization system is under construction for one of the plants and the operation is scheduled for Dec. 1974. Its capacity is 550,000 N cu m/hr, desulfurization rate, 85%, and by-products will be lime-gypsum. For smog emergencies, the company has a program for switching to low sulfur fuel oil at any time. Nitrogen oxides emission is being controlled by two-stage combustion at several plants, and remodeling is scheduled at several others for 1974. Soot is controlled by mechanical dust collectors and electrostatic precipitators. All new boilers will have electrostatic precipitators. The meteorological conditions are constantly monitored and dispersion conditions are studied by measurements and calculations.

1973

37834

APTIC NO. 60759

Abel, W. T., M. Zulkoski, G. A. Brady, and J. W. Eckerd

REMOVING PYRITE FROM COAL BY DRY-SEPARATION METHODS. Bureau of Mines, Morgantown, W. Va., Morgantown Energy Research Center, RI 7732, 30p., 1973. 11 refs.

A dry process for removing pyrite from coal pulverized to powerplant fineness was investigated. The process consists of

two cleaning steps: centrifugal separation to remove a fine, pyrite-depleted portion as a product, and electrostatic separation to concentrate and reject the pyrite. Ball milling and Hardgrove milling were used to pulverize the coal. Three coals from the Pittsburgh seam were treated and over 55% of the pyrite, which amounted to 70% of the available pyrite, was removed in a reject of 10-20% from one of the coals. Similar treatment of the other two coals removed about 35-50% of the pyritic sulfur, which amounted to about 70% of the available pyritic S from the coals. Both centrifugal and electrostatic separations were more efficient when pyrite particles were as large as possible. Separation efficiency was improved by confining the particle size of the feed to a relatively narrow range and by avoiding excessive amounts (more than 10%) of dust in the electrostatic range. The removal efficiency was increased with the use of the stage grinding. (Author abstract modified)

37835

APTIC NO. 56445

Armento, W. J. and W. L. Sage

THE EFFECT OF DESIGN AND OPERATION VARIABLES ON NOX FORMATION IN COAL FIRED FURNACES. Environmental Protection Agency, Research Triangle Park, N. C., Proc. Coal Combust. Semin., Research Triangle Park, N. C., 1973, p. 193-204. (June 19-20.)

NTIS: PB 224210/AS

Relative effects of changes in operational and design variables were determined for a coal-fired furnace unit. The most effective means of controlling nitrogen oxide emissions from an operational point of view resulted from the control of excess air, preheat, and load together, all three being heavily interdependent. Control of the combination of lower preheat and excess air did not appear to be more effective than control of excess air alone when load could not be varied. Pilot plant results indicated that the concepts of staged combustion or delayed mixing are the most effective means of NOx reduction. Operator acceptance seems assured if this can be accomplished by progressive mixing in the individual burner zone. Unacceptable slagging and corrosion problems may be encountered if effective control requires a wide physical separation of the two sources of air. Flue gas recirculation was found to be effective in reducing thermal fixation of NO, but it appears that it may increase the amount of NO formed from conversion of fuel bound nitrogen. (Author summary modified)

37836

APTIC NO. 61290

Asai, Satoru

STUDIES ON THE ELIMINATION OF BAD ODORS. 2. REMOVAL OF BAD ODORS BY ABSORPTION. (Akushu jokyō ni kansuru kenkyū. 2. Kyūshūho ni yoru akushu no jokyō). Text in Japanese. Osaka-fu Taiki Ōsen Bōshi Gijutsu Shiryo (Data Preven. Air Pollut. Osaka Prefect.), no. 9:7-34, April 1973. 45 refs.

Methods of odor removal by absorption and designs for towers for removal of odors by chemical reaction are discussed. Data are given for the solubility of gases such as hydrogen sulfide, ammonia, methylamine, ethylamine, trimethylamine, lactic acid, butylene, and sulfur dioxide in water and various salt solutions. Examples are given of the dissolution of sulfur dioxide in sodium sulfite and ammonium sulfite solutions, of hydrogen sulfide in ammonia water and in aqueous solutions of sodium carbonate and potassium carbonate, and of hydrogen sulfide in mono-, di-, and triethanolamine. Diffusion coefficients in the gaseous and liquid phases are also discussed. With regard to the design of absorption towers, detailed explanations were made of total capacity coefficient, packing towers, bubble towers, porous towers, and calculation of required height of the towers. Theories are developed for the countercurrent contact type and multistage contact type absorption towers.

37837

APTIC NO. 61177

Bartholome, E.

NON POLLUTING TECHNOLOGIES. (Umweltfreundliche Technologien). Text in German. Umwelt Aktuell., (4):91-107, 1973. (Presented at the Congress Umwelt 72, Stuttgart, Germany, June 30-July 9, 1972.)

The efforts by the chemical industry to combat the emission of carbon monoxide, sulfur dioxide, oxides of nitrogen, hydrocarbons, and dust are described. They generally include process modification or replacement, and/or installation of control methods. Old sulfuric acid plants have been and are being replaced by twin-contact plants which remove 99.5% of the sulfur, instead of 90% in the old plants. For nitric acid production, the absorption process was improved by application of higher pressures and the use of plate columns instead of packed columns. In some cases an alkaline absorption follows the main absorption. Due to these measures emissions were lowered the past years to 40% of the 1961 emissions of oxides of nitrogen while nitric acid production rose 165%. For reduction of the dust emission, coal gasification was abandoned and a petrochemical method for production of synthetic gas is used. Dusts are efficiently removed by dust collectors. Of the numerous dust collectors available, the annular slot scrubber is described. Carbon monoxide containing waste gases of the chemical industry are usually burned in power plants or in a flare. Hydrocarbon-containing gases are also burned in flares. Hydrocarbons with two or more carbon atoms in the molecule produce soot. This is usually avoided by injection of steam into the flame. Combustible odorous substances are likewise burned in flares. This method is used particularly in formaldehyde and amine production. Diluted odorous gases can be treated in venturi scrubbers or in thermal or catalytic afterburners.

37838

APTIC NO. 60400

Batel, Wilhelm

THE SCRUBBER FOR DUST COLLECTION - STATE-OF-THE-ART AND TRENDS PART I. (Der Waschenstauber - Entwicklungsstand und-tendenzen - Teil I). Text in German. Staub, Reinhaltung Luft, 33(12): 491-497, 1973.

In scrubbers for dust collection the dust-laden gas passes around droplets or sprayed packing materials. The dust particles are separated by the forces of inertia (and under certain conditions also by molecular diffusion) and electrical forces. The operating range of scrubbers depends on the design and extends from grain sizes of 0.1 to 5 microns. They are of advantage if other tasks such as absorption, cooling, wetting or reducing the danger of inflammation must also be accomplished. In some cases the low investment costs, the simple operation or the low space demand lead to the selection of a scrubber for dust collection. Of disadvantage are the high operating costs and the necessary sludge treatment. The theoretical principles underlying the various phases of wet dust collection are reviewed. The design of the venturi scrubber the mechanical dispersion scrubber, the centrifugal scrubber, the jet scrubber and the impaction scrubber where the gas flow impacts on a water level are described in greater detail.

37839

APTIC NO. 60635

Beckmann, Franz and Hugo Brocades-Zaalberg

SMOKELESS FUEL BRIQUETTES PRODUCTION. (Verfahren zur Herstellung raucharmer Brennstoffbriketts). Text in German. (Eschweiler Bergwerks-Verein, Kohlscheid (West Germany)) W. Ger. Pat. 1,571,710. 6p., Oct. 31, 1973. 4 refs. (Appl. June 15, 1971, 3 claims).

Process for the production of smokeless fuel briquettes by hot-pressing a finely-divided mixture of coals softening at press temperature is described. The coal has a temperature below the softening point, and it is heated, with an inert material which does not, or hardly softens at press tempera-

ture, to a sufficiently high temperature so that the mixture has the temperature required for the subsequent pressing. Prior to pressing, the mixture is subjected to degassing for the removal of volatile components. The degassing period, ranging from 1 to 15 min, and the degassing temperature, ranging from 450 to 530 C, are selected so that the low-temperature tar yield of the briquette is reduced during the forming period to 0.2-0.8%. Degassing is done without external heat supply at constant or slightly reducing temperature of the briquette goods.

37840

APTIC NO. 61217

Becvar, Josef

CONTROL OF SOLID PARTICLE EMISSION FROM INDUSTRIAL PROCESSES. (Likvidace prasnosti vznikajici pri prumyslovych procesech). Text in Czech. Zdravot. Tech. Vzduchotech., 16(5):256-268, 1973. 2 refs.

Methods for eliminating the escape of solid particles from industrial processes into the atmosphere are discussed. Equipment includes exhaust fans, wet dust collectors and filters. Diagrams of the dust collectors which remove up to 99% of the particles, at gas flow rates of up to 90,000 cu m/hr are shown. Filters woven of natural fibers are effective because of the scaly surface of the fiber, but they can only be used at moderate temperatures (less than 90 C). Polyester fabrics are temperature-resistant but they are too smooth to retain dust particles. Non-woven polyester filters can be produced by stitching loose polyester fibers to both sides of a woven fabric. These filters are efficient and can be used at elevated temperatures (about 140 C).

37841

APTIC NO. 61283

Berg, Arthur Henry

APPARATUS FOR COLLECTING FILTERED AIRBORNE. (Cambridge Filter Corp., Syracuse, N. Y.) U. S. Pat. 3,757,496. 14p., Sept. 11, 1973. 3 refs. (Appl. July 13, 1972, 16 claims).

An apparatus for collecting filtered airborne solid particles is described. It employs a rectangular section of filtering screen affixed to arcuate and vertical frame members to prevent a semi-cylindrical surfaced filtering screen arranged in the path of flow of air. A suction nozzle has an orifice reciprocally movable about an axis concentric with the axis of the arcuate members and screen. A means for applying suction to remove solid particles from the concave side of the screen, optional means to stop the oscillation midway across the screen, and a perforate semi-cylindrical support shell disposed on the outside of the screen are included in the apparatus. This apparatus can be used to filter air in the textile industry. (Author abstract modified)

37842

APTIC NO. 61363

Berger, Heinz and Heinz-Werner Berger

APPARATUS FOR DETOXIFYING EXHAUST EMISSIONS OF AN INTERNAL COMBUSTION ENGINE. (Assignee not given.) U. S. Pat. 3,775,064. 9p., Nov. 27, 1973. 11 refs. (Appl. Sept. 20, 1971, 27 claims).

An antipollution device for detoxifying exhaust gases of an internal combustion engine is described. This catalytic exhaust gas reformer has three nested coaxial tubes, the inner two of which are perforated. The annular chamber between the inner tube and the intermediate tube is filled with a mass of catalyst kept in a packed condition by a spring-biased disk defining one end of the intermediate chamber. For this purpose, the inner tube is conical and the intermediate tube can be cylindrical or conical. The outer chamber is filled with catalyst impregnated insulation and is provided with gas outlets, while an entrance chamber communicates with the inner tube and is fed with raw exhaust gases from the engine through a feed chamber partially surrounding the outer tube. A burner is provided in the entrance chamber to heat up the catalyst during the first moments of engine operation to prevent fouling of the catalyst.

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The end of the apparatus may be removed for replacement of either of the inner two tubes, of the insulation, or of the catalyst. This apparatus overcomes the disadvantages of prior antipollution devices. (Author abstract modified)

37843

APTIC NO. 61367

Bernstein, Leonard S., Anantha K. S. Raman, and Eric E. Wigg

NITROGEN OXIDE CONVERSION USING REINFORCED NICKEL-COPPER CATALYSTS. (Esso Research and Engineering Co.) U. S. Pat. 3,773,894. 6p., Nov. 20, 1973. 8 refs. (Appl. July 22, 1971, 10 claims).

A process is described for converting nitrogen oxides in internal combustion engine exhaust gas into harmless constituents. Exhaust gases are contacted with a reinforced nickel-copper catalyst comprising a high temperature and oxidation resistant metallic reinforcing member and a catalytically active nickel-copper surface layer comprising about 40 to 95% by weight nickel and about 5 to 60% by weight copper. Although numerous nickel-oxide and other catalysts have been suggested for removing NOx from automobile exhausts, these catalysts have not proved to be durable and effective enough. The catalyst described is both durable and effective. (Author abstract modified)

37844

APTIC NO. 60601

Berz, Max and Wolfgang Berz

DEVICE FOR THE SEPARATION OF SOLID PARTICLES FROM GASEOUS MEDIA (RAW GASES). (Einrichtung zum Abscheiden von Festkoerperteilchen aus Einem gasfoermigen Medium (Rohgas)). Text in German. (Assignee not given.) W. Ger. Pat. 1,607,671. 5p., Nov. 8, 1973. 6 refs. (Appl. Nov. 22, 1967, 6 claims).

A device for the separation of solid particles from waste gases is described. The device is composed of a turbulence chamber placed at the bottom, and of a loose-material filter bed placed in the upper part of a common upright, cylindrical space. The turbulence chamber, used as a preliminary stage, and the space over the filter bed are connected through a central tube. The gas from the turbulence chamber is admitted to the filter bed from its top where crater formation is prevented by a rotating flattening comb. A rotating air nozzle also immerses into the filter bed.

37845

APTIC NO. 60766

Boscak, Vladimir and J. S. Tandon

ODOR ABATEMENT IN ANIMAL FOOD MANUFACTURING PLANTS. Preprint, 7p., 1973. 10 refs. (Presented at the Southwestern Ohio Conference on Energy and the Environment, 1st, College Corner, Ohio, Oct. 25-26, 1973.)

Odor control considerations in the animal food manufacturing industry are reviewed, and the results of installation of a packed tower scrubber in a dog and cat food manufacturing plant in Minnesota are presented. The main source of odors from animal food manufacturing is the baking oven. Installation of a chemical absorption tower scrubber at one such facility has successfully reduced the odors below the level specified by Minnesota Pollution Control Agency Regulations. The tower scrubber is designed so that the gas has approximately one second retention time in the packing, and the scrubbing liquid is a water solution of potassium permanganate. The rate controlling step appears to be on both liquid and gas phase side. Scrubber efficiency is 93.3%.

37846

APTIC NO. 60588

Calvert, Seymour, Jhuda Goldshmid, David Leith, and Nikhil C. Jhaveri

FEASIBILITY OF FLUX FORCE/CONDENSATION SCRUBBING FOR FINE PARTICULATE COLLECTION. (FINAL REPORT). A.P.T., Inc., Riverside, Calif., Environmental Protection Agency Contract 68-02-0256,

Program Element 1AB012, ROAP 21ADL, EPA-650/2-73-036, 158p., Oct. 1973. 69 refs.

NTIS: PB 227307

An experimental and theoretical program was carried out to determine the feasibility of flux force/condensation (FF/C) scrubbing for fine particle control. The FF/C scrubbing includes the effects of diffusiophoresis, Stephan flow, thermophoresis, and particle growth due to the condensation of water vapor and is not restricted to any specific scrubber configuration. Fine particles are those smaller than 2.0 micron in diameter. The program determined whether a development program to maximize FF/C effects was warranted and detailed the recommended program. The scope of analytical and experimental work was limited to the exploration of the most essential features. Experimental determination of sub-micron particle collection efficiency in a bench-scale, sieve plate type FF/C scrubber validated the mathematical model which had been developed in the analytical phase of this program. Process designs and cost estimates for the application of the FF/C scrubbing to two fine particle pollution sources demonstrated its technical and economic potential feasibility. The FF/C scrubbing is an attractive control method for fine particles when high efficiency is required and when the gas is hot enough to evaporate the necessary water vapor. Further development of FF/C scrubbing is clearly warranted. (Author abstract)

37847

APTIC NO. 60380

Christensen, Kenneth M., Howard E. Bauman, Robert G. Walker, and Bob K. Davis

APPARATUS FOR REMOVING DUST FROM AN AIR STREAM. (Pillsbury Co., Minneapolis, Minn.) U. S. Pat. 3,754,378. 9p., Aug. 28, 1973. 5 refs. (Appl. Sept. 8, 1971, 11 claims).

A filter is described which removes dust from an air stream. It consists of a filtration bed composed of a multiplicity of granules that are coated with a thin film of dust-trapping liquid (normally water). The air stream containing dust particles is forced through the wetted bed until the liquid film is nearly evaporated. The granules in the bed are then subjected to violent agitation to shake the accumulated dust from their surfaces into an auger conveyor which removes the dust to a collecting bin. The apparatus consists of a plurality of adjacent chambers mounted on the periphery of a large drum that rotates past the wetting section, a filtration section, and an agitation section in which hammers strike successive chambers to agitate and thereby remove collected contaminants. This equipment overcomes shortcomings of prior equipment: it can efficiently remove large and small particles; it removes and recovers trapped dust from the filter medium; it operates over a wide range of temperatures; it operates continuously with no back-flushing and with a relatively low back pressure across the filter; it operates continuously without blockage of the filter; the granules are agitated only when the trapped contaminants are in a removable condition; the filter element resists high temperatures and corrosion; and the system can reliably handle gas streams with suspended particulates at high humidity levels. (Author abstract modified)

3/848

APTIC NO. 60546

Clement, John Lloyd

PROCESS FOR THE ABSORPTION OF GASEOUS SULFUR DIOXIDE FROM GASES. (Verfahren zur Absorption von gasförmigem Schwefeldioxid aus Gasen). Text in German. (Babcock and Wilcox Co., New York) W. Ger. Pat. 1,960,387. 8p., Oct. 11, 1973. 2 refs. (Appl. Dec. 2, 1969, 1 claim).

A process for the absorption of gaseous sulfur dioxide from gases is described. The gas to be cleaned is passed through a series of absorption zones designed as venturi scrubbers, in which it contacts aqueous solution of magnesium disulfite and magnesium monosulfite. The aqueous and gaseous phases are

separated after each of the absorption zones, and the bulk of the separated liquid is recycled in the corresponding absorption zone, while a smaller fraction is led from one absorption zone to another in counterflow to the gas to be cleaned. The liquid separated after the first absorption zone is removed from the cycle. The fresh water supply to the last two absorption zones is distributed so that excessive dilution of the liquid in the last absorption zone is avoided.

37849

APTIC NO. 60629

Comfort, E. H. and W. M. Sun

APPLICATION OF A GENERAL THERMAL ANALYZER TO THE AUTOMOBILE POLLUTANT CATALYTIC CONVERSION PROBLEM. Preprint, American Society of Mechanical Engineers, New York and American Inst. of Chemical Engineers, 15p., 1973. 11 refs. (Presented at the American Society of Mechanical Engineers/American Institute of Chemical Engineers, Heat Transfer Conference, Atlanta, Ga., Aug. 5-8, 1973.)

The construction of heat and mass transfer networks and the relations used to account for the chemical reaction are described for a general thermal analyzer which has been successfully applied to the automobile pollutant catalytic conversion problem for the case of monolithic catalyst support structures. The mathematical model was developed using one of the class of general thermal analyzers known as CINDA. This approach required that a lumped-parameter network representation of the physical problem be constructed, and the model considered no radial variation in the converter inlet exhaust gas properties. Three mass transfer CINDA networks were provided in the model: carbon monoxide, fast hydrocarbons, and slow hydrocarbons. First-order kinetics with respect to each of the pollutant species were assumed, and a detailed simulation of an actual CVS-1 driving cycle test was undertaken for verification of the model. Measured differences between inlet and exit gas temperature were compared with predicted values; and agreement was good at some points during the cycle and fair at others, the general shape of the response being correct. Inclusion of mass transfer networks through analogy with the heat transfer equation proved feasible.

37850

APTIC NO. 61365

Cosgrove, Lee A. and James E. McEvoy

AUTO EMISSIONS CATALYST. (Air Products and Chemicals, Inc., Wayne, Pa.) U. S. Pat. 3,770,659. 3p., Nov. 6, 1973. 4 refs. (Appl. Oct. 1, 1971, 2 claims).

The active catalyst for burning pollutants exhausted from an internal combustion engine consists essentially of sorptive alumina matrix, about 5 to 18 wt% manganese monoxide, 2 to 8 wt% chromium sesquioxide, and about 0.01 to 0.2 wt% palladium. The unit weight ratio of manganese monoxide to chromium sesquioxide is greater than about 2 and less than about 3.5, and the total weight of such oxides is from 8 to 24%. This catalyst is much cheaper than previous emissions catalysts. (Author abstract modified)

37851

APTIC NO. 60689

Croon, I.

SOME SYSTEMS DEVELOPED FOR POLLUTION ABATEMENT IN THE PULP INDUSTRY, PARTICULARLY OXYGEN BLEACHING. European Liaison Committee for Cellulose and Paper, Proc. EUCPA Conf., 15th, Harmonizing Pulp Paper Ind., Environ., Rome, 1973, p. 229-253, 298-305. 10 refs. (May 7-11.)

Some systems developed for pollution abatement in the pulp industry are discussed with emphasis on oxygen alkali delignification. The systems were developed by MoDo AB, Sweden and Chemetics, Ltd., Canada and include condensate treatment, scrubbing, and thermal oxidation of reduced sulfur compounds as well as the use of the MoDo scrubber. During con-

ventional production of bleached pine kraft pulp and lowering of the color corresponding to about 210 kg/platinum/ton pulp is obtained. Oxygen bleaching offers unique possibilities to lower these pollution problems by internal solutions. The air pollution odor is caused by emission from various places in the mill of reduced sulfur compounds such as hydrogen sulfide and organic sulfur compounds. These gases are collected and treated by scrubbing and thermal oxidation systems. In mills where direct contact evaporators are used, the flue gases are an important odor source which can be solved by strong black liquor oxidation which inhibits the flue gases to strip out the reduced S compound. The main source for sulfur dioxide emission is the flue gases from the recovery boiler. This emission can be eliminated by scrubbing with caustic solutions. Such a system can also be combined with heat recovery, for example in the MoDo scrubber system.

37852

APTIC NO. 61334

Culp, Norris B.

EXHAUST POLARIZING APPARATUS. (Assignee not given.) U. S. Pat. 3,769,799. 5p., Nov. 6, 1973. 5 refs. (Appl. Jan. 22, 1971, 2 claims).

An apparatus for polarizing exhaust gases is described. A polarizing container having an inlet and an outlet is connected to a source of compressed air. An igniter is mounted to the container and extends inside. Thermal electrical coils are mounted within the container perpendicular to the flow of exhaust gases through the container. The thermal electrical coils heat the exhaust gases which are combined with the compressed air and ignited. Deflectors are mounted within the container for guiding the flow of exhaust gases. An induction coil connected to a source of direct current electrical energy has a core with movable contact and controls the igniter. This invention is essentially an afterburner which can be used to reduce hydrocarbon emissions from gasoline or diesel engines or industrial sources such as incinerators. This invention is an improvement over prior art since it is relatively inexpensive to produce and operate and is relatively less complex than other devices. It gives greater reduction in hydrocarbons than other devices by arranging the coils perpendicular to the direction of flow of the exhaust gases. (Author abstract modified)

37853

APTIC NO. 60761

Darby, K. and K. R. Parker

CONTROL OF EMISSION FROM COMBUSTIVE AND NON-COMBUSTIVE SOURCES. Preprint, National Society for Clean Air, Brighton (England), 42p., 1973. 3 refs. (Presented at the National Society for Clean Air, Annual Conference, 40th, Torquay, England, Oct. 15-19, 1973.)

Methods for the removal of particulate emissions from industrial processes, both of the combustive and non-combustive type, are reviewed in terms of some of the more specialized and less known gas cleaning problems. Factors affecting the selection of various gas cleaning devices, i.e., cyclone, bag filter, scrubber, and electrostatic precipitator, include: the volume of gas handled, the temperature of the gas leaving the process, the moisture and acid content of the gases, gas composition, gas operating pressure, dust concentration and size, and process conditions. Typical operating temperature ranges for the cyclone, fabric filter, scrubber, and electrostatic precipitator are respectively: 450 C, 200 C, no limit, and 450 C. Methods of temperature reduction include: mixing with atmospheric air, introduction of atomized water to effect cooling by evaporation, and indirect heat extraction such as waste heat boilers. Major sources of pollution and techniques for their control are outlined for iron and steel production, foundry processes, cement making, glass melting furnaces, zinc and lead processing, aluminum production, and materials handling, drying, and grinding applications.

56

37854

APTIC NO. 60754

Datwyler, W. F., A. Blatter, and S. T. Hassan

CONTROL OF EMISSIONS FROM LIGHT PISTON-ENGINE AIRCRAFT. Bendix Corp., Southfield, Mich., Research Labs., Office of Air and Water Programs Contract 68-04-0045, Rept. APTD-1521, 202p., May 1973. 23 refs.

NTIS: PB 230900/AS

The control of emissions from light piston-engine aircraft primarily by existing automotive emission control techniques was investigated. Control techniques considered were those used to reduce hydrocarbons and carbon monoxide since the rich mixtures normally used in aircraft operation inherently lead to low levels of oxides of nitrogen. Emission control techniques and systems selected for evaluation were: variations of air-fuel ratio and ignition timing; exhaust treatment by air injection, thermal reaction, and catalytic conversion; and return of crankcase gases to the intake manifold (positive crankcase ventilation). The results indicated that further investigation of piston engine emissions should initially emphasize fuel and air management over exhaust treatment as the most promising approach to the control of emissions from light piston-engine aircraft.

37855

APTIC NO. 61364

Dautzenberg, Fritz M., Herman W. Kouwenhoven, and Jaap E. Naber

SHAPED ACCEPTORS FOR BINDING AND REMOVING SULFUR OXIDES FROM FLUE GASES AND PROCESS FOR THEIR MANUFACTURE. (Shell Oil Co., New York) U. S. Pat. 3,770,647. 5p., Nov. 6, 1973. 16 refs. (Appl. July 27, 1970, 11 claims).

A process is disclosed for the manufacture of shaped articles which are suitable to be used as solid acceptors in gas cleaning processes by mixing a dehydrated refractory oxide with a ceramic binder, forming the mixture into a shaped article, heating the shaped article to a temperature to form a ceramic article, impregnating it with a metal compound, and then calcining the formed, impregnated article. These acceptors can be used to remove sulfur oxides and other pollutants from flue gases. Unlike previous acceptors, the acceptors manufactured by this process do not crack and scale after a relatively short period of use. (Author abstract modified)

37856

APTIC NO. 61259

Davids, Peter, Kurt Gerhards and Werner Brocke

THE PRESENT AND FUTURE AIR POLLUTION BY INCINERATORS - EMISSION AND REDUCTION OF EMISSIONS. (Die derzeitige und zukünftige Luftverunreinigung durch Muellverbrennungsanlagen - Emission und Emissionsverminderung). Text in German. Staub, Reinhaltung Luft, 33(12): 483-489, 1973. 43 refs.

Measurements carried out in many refuse incineration plants have shown that, by using high-quality dust separators (electrostatic precipitators) or by optimum firing, it is possible to reduce the emission of dust and of unburned organic gases to relatively satisfactory values. However, the emissions of inorganic gases such as hydrogen chloride, hydrogen fluoride, sulfur dioxide, and nitrogen oxides present problems. About one half of the present HCl emission is due to the burning of chlorinated plastics (PVC). A forecast made for 1980 shows that this emission will increase. At present, wet separation is used to remove HCl and HF from waste gas. Operating experience and possibilities of optimizing the method are discussed.

37857

APTIC NO. 61320

Di Prospero, Peter

POLLUTION CONTROL DEVICE. (Assignee not given.) U. S. Pat. 3,757,708. 7p., Sept. 11, 1973. 7 refs. (Appl. Sept. 22, 1971, 7 claims).

A pollution control device is described which is made up of a closed tank containing water. Flue gases are directed into this tank; water is sprayed on the gases prior to entry to the tank. The sprayed water entrains all solid material which falls into the water in the tank and is cleaned out periodically. The matter entrained in the water in the tank floats over a partition into a second compartment where it is skimmed, and the scum is directed into a fire box of the furnace. The effluent water from the second tank is supplied to the sprayer and sprayed into the incoming flue gas. This method can be used to arrest smoke, carbon dioxide, carbon monoxide, other gases, and particulate matter. The device is simple in construction, economical to manufacture, and simple and economic to use. (Author abstract modified)

37858

APTIC NO. 61359

Domnitch, Irving

INCINERATOR EMISSIONS REDUCTION SYSTEM. (Assignee not given.) U. S. Pat. 3,772,855. 6p., Nov. 20, 1973. 5 refs. (Appl. Feb. 14, 1973, 6 claims).

A module for use in a system which upgrades the quality of pollution control within incinerators in which particulate emission is significantly reduced through automatic wet scrubbing of the smoke to remove particulate and other harmful material before emission of the smoke into the air is described. The system operates automatically in the presence of smoke and is self-cleaning. The module is positioned within an expansion chamber and comprises a porous barrier, spray heads, and a collection chamber for soaking, collecting, and removing particulate. This method is more simple, straightforward, and reliable than conventional scrubbers. (Author abstract modified)

37859

APTIC NO. 61137

Downing, Paul B.

AN ECONOMIC ANALYSIS OF PERIODIC VEHICLE INSPECTION PROGRAMS. Atmos. Environ., 7(12):1237-1246, 1973. 8 refs.

Preliminary data are presented on the cost and effectiveness of an annual automobile emission inspection system. Analysis of devices chosen through the use of a least cost linear programming model indicates that several retrofit devices are more economically efficient than inspection. Annual pre-announced inspection appears to be called for only after spark retard and exhaust recycle devices have been installed on all 1965 and older cars and exhaust recycle and evaporation control devices have been installed on all 1966-1970 cars. Annual pre-announced inspection may be less effective than current studies indicate because of the tendency of owners to deliberately maladjust new vehicles. Data do not presently exist to allow any empirical comparison of annual pre-announced inspection versus side-of-the-road inspection. (Author conclusions modified)

37860

APTIC NO. 61269

Fields, Marvin C. and Ladislaus Walter Sumansky

PROCESS FOR REMOVING NITRIC OXIDE FROM GASEOUS MIXTURES. (U. S. Steel Corp.) U. S. Pat. 3,773,897. 5p., Nov. 20, 1973. 3 refs. (Appl. Oct. 19, 1970, 12 claims).

A continuous process for removal of nitric oxide from coke oven gas with ozone even when its mol ratio to NO is as low as 2/1 is described. The ozone is introduced uniformly over the cross section of the coke oven gas. Problems existed in previous methods when low mol ratios of O₃ to NO occurred. This invention solves these problems and can be used in gas plants of commercial size. (Author abstract modified)

37861

APTIC NO. 60990

Fischer, Berthold

DUST CONTROL IN SURFACE MINING AND DRESSING PLANTS WITH RESPECT TO LABOR SAFETY AND ENVIRONMENTAL PROTECTION. (Die

Staubbekaempfung im Tagbau und in Aufbereitungsanlagen im Hinblick auf den Dienstnehmer- und Umweltschutz). Text in German. Berg Huettenmaenn. Monatsh., 118(6):181-184, June 1973.

Problems and possibilities of dust control in surface mining and processing plants of the stone and earth industry are discussed. The maximum allowable 8-hour workplace concentration of dust, now 150 mg/cu m in West Germany, will be reduced to 20 mg/cu m for toxic dusts, to 50 mg/cu m for quartz-containing dusts, and to 100 mg/cu m for other dusts. Dust emissions in surface mining and in processing plants of the stone and earth industry can be effectively reduced by such measures as air-tight design of the processing equipment, the use of wet processes to minimize dust formation, the use of less harmful materials in place of silicogenic materials, effective ventilation, automatization, remote control, and by the collection of dust-laden waste gases and efficient dust separation. Dust deposits should be removed from surfaces without scattering dust.

37862

APTIC NO. 60636

Fischer, Friedrich, Wolfgang Pfeiffer, and Georg Baurhenne

HYDROGEN SULFIDE REMOVAL FROM GAS MIXTURES. (Verfahren zur Abscheidung von Schwefelwasserstoff aus Gasgemischen). Text in German. (Bamag Verfahrenstechnik GmbH Butzbach (West Germany)) W. Ger. Pat. Appl. 2,137,725. 8p., March 29, 1973. 1 ref. (4 claims).

A process for the removal of hydrogen sulfide from gases containing oxygen is described. The H₂S present in the waste gas is oxidized by the oxygen present in the gas, and adsorbed on activated carbon containing silver iodide in a temperature range of 10-120 C, preferably 20-100 C. The activated carbon contains 0.1-5%, preferably 0.5-1.5% silver iodide. To obtain silver iodide-containing activated carbon, the latter is treated with an alkaline iodide solution, and then with silver sulfate solution or with a similar, silver-containing solution. The elemental sulfur adsorbed by the activated carbon is removed by means of liquid carbon disulfide, and elemental, readily crystallizing sulfur is obtained by evaporating the solvent. The activated carbon is then washed with water for the removal of sulfuric acid. The washing water contained 3.3% sulfuric acid with respect to H₂S. The activated carbon had an H₂S adsorption capacity of 64.5%. Neither desorption with CS₂ nor washing with water caused silver and iodide losses.

37863

APTIC NO. 61276

Fonseca, Marco A., Enrique T. Gibbon, and Jose J. Gonzalez

AUXILIARY ANTIPOLLUTION AIR INTAKE DEVICE FOR INTERNAL COMBUSTION ENGINES. (Monocar HC Internacional S.A., Edo de Mexico (Mexico)) U. S. Pat. 3,756,270. 9p., Sept. 4, 1973. 10 refs. (Appl. April 25, 1972, 13 claims).

A fuel economizer device for reducing pollution from exhaust gases discharged by nonsupercharged gasoline-powered internal combustion engines is described. It includes two basic members having aligned air passageways and adjustably connected at their adjoining ends. One of the members has an intake opening in its free end portion and a passageway including adjacent frusto-conical divergent and convergent portions defining a valve chamber of diamond configuration in the longitudinal section. The member has a seating surface at the juncture of the passageway with the divergent portion. The other member has an outlet in its free end portion connectable to the air/fuel intake system of the engine. A valve body in the valve chamber is suspended between first and second springs which extend in opposite directions into the air passageways. The spring biasing the valve body toward seating has a stiffness exceeding that of the other spring, whereby the valve body normally is seated to closed the passageway. Increases of vacuum at the intake system of the engine, due, for example, to unloading of the engine, displace the valve body from

its seat to provide an annular air passage around the valve body of increasing cross section in accordance with valve body displacement. A smoothly increasing amount of auxiliary air flow is thereby provided to the engine intake in proportion to vacuum at the intake. Adjustment of the members relative to each other varies spring pressure to regulate valve body displacement in accordance with particular engine requirements so that the device is adaptable to a wide variety of engines. By thus varying the air/fuel ratio according to engine operating conditions, combustion efficiency is increased and air pollution is decreased. (Author abstract modified)

37864

APTIC NO. 60888

Forney, A. J. and W. P. Haynes

CLEAN FLUID FUELS FROM COAL AND WASTES. J. Eng. Power, 1973:142-144, July 1973. 27 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, New York, Nov. 26-30, 1972, Paper 72-WA/APC-3.)

Recent developments in the research on conversion of coals and wastes to more usable clean fuels, viz., gas and oil, are reviewed. Processes considered include: coal conversion to high- and low-Btu gas, coal to oil, wastes to gas, and wastes to oil. The Bureau Synthane Process is an example of a process proceeding to a prototype plant stage. The coal conversion to high-Btu process consists of gasification, water-gas shift, gas purification, and methanation. A pretreatment step to render caking coal noncaking is also required. Methods for making a low Btu gas from coal include: the commercial Wellman Calusha, the commercial Lurgi, Texaco, Koppers-Totzek, and the Bureau of Mines entrained gasifier. Advanced combined-cycle power systems using a low-Btu gas from coal gasification will require a medium-pressure gasifier; preferably a hot clean-up of the tar, dust, and sulfur from the gas; a gas turbine; and a steam boiler with steam turbine. The only commercial coal to oil process now in operation is a plant at Sasol South Africa which utilizes the Lurgi gasifier plus the Fischer-Tropsch reaction of hydrogen plus carbon monoxide to make a whole range of hydrocarbon products from solid wax to methane. The Bureau of Mines is experimenting with wastes to gas processes, one of which employs hydrogasification to convert carbon in municipal solid wastes to methane. Waste to oil processes are also being developed by the Bureau. All types of cellulosic wastes, including urban refuse, agricultural wastes, sewage sludge, wood, lignin, and bovine manure, have been converted to oil by a reaction with carbon monoxide and water at 650-800 F and 1000-4000 psi in the presence of catalysts.

37865

APTIC NO. 61306

Fornoff, Louis Leonard, John Joseph Collins, and Charles Matthew Madigan

REMOVAL OF MERCURY FROM GAS STREAMS. (Union Carbide Corp., New York) U. S. Pat. 3,755,989. 4p., Sept. 4, 1973. 3 refs. (Appl. June 16, 1972, 5 claims).

A method is described for removing mercury from gas streams containing more than 60% relative humidity. The mercury is removed by raising the gas stream temperature to lower the relative humidity to less than 50% and by thereafter selectively adsorbing the mercury vapor by passage through an activated carbon adsorbent bed under conditions such that water does not condense on the carbon adsorbent. This method can be used to remove mercury from tail gas streams of various industrial processes, such as the production of chlorine by the electrolysis of sodium chloride with a metallic mercury containing electrode (chlor-alkali plants). (Author abstract modified)

37866

APTIC NO. 61335

Frevel, Ludo K. and Leonard J. Kressley

REMOVAL OF CARBON MONOXIDE FROM AIR. (Dow Chemical Co., Midland, Mich.) U. S. Pat. 3,758,666. 4p., Sept. 11, 1973. 7 refs. (Appl. Jan. 14, 1971, 9 claims).

AIR POLLUTION ABSTRACTS, AUGUST 1974

Air containing carbon monoxide is contacted with a palladium catalyst under ambient conditions. It is believed that carbon monoxide removal is achieved by initial adsorption and subsequent oxidation to carbon dioxide on the catalyst surface. When the catalyst loses its effectiveness, simply reducing the pressure on the catalyst restores its activity. The catalyst may also be reactivated by purging with a gas and heating. Unlike previous catalytic processes, this process removes CO at ambient conditions, avoiding the need to elevate temperatures, which are often economically prohibitive for smaller unit operations. (Author abstract modified)

37867

APTIC NO. 60416

Fusamura, Nobuo, Takashi Iwasaki, and Hideaki Sekiguchi

ON THE EFFICIENCY OF FINE DUST COLLECTION BY THE MODIFIED CONDENSATION DUST COLLECTOR. (Gyoshushiki jojin sochi no baijin jokyo seino). Text in Japanese. Waseda Daigaku Rokogaku Kenkyusho Hokoku (Bull. Sci. Eng. Res. Lab., Waseda Univ.), 63:50-52, 1973. 2 refs.

A condensation dust collector uses sonic waves or steam to condense small dust particulates into large particles to increase the efficiency of their removal by a cyclone. However, such dust collectors require high-pressure steam which makes the system less practical. The experimental dust collector system introduced here used comparatively low-pressure steam, (i.e., 0.5 kg/sq cm). Low-pressure steam is injected into the dusty gas, mixed with the gas, and then cooled rapidly to liquefy the steam so that water droplets which take fine dust particulates as their cores may be formed. The fine dust particulate enclosed in the condensed steam or water is easily arrested by an ordinary cyclone. The experimental system consists of a boiler unit generating the required steam, a venturi mixer, a condenser, a scrubber, and a cyclone. The performance of the dust collector with and without the steam injection was evaluated. Dust collection efficiency was 57.2% with steam injection against 26.4% without dust particulates small than 0.1 micron, 78.5% against 46.4% for 0.1-1 micron particulates, 83.8% against 58.6% for 1-5 micron particulates, and 88.2% against 72.0% for particulates larger than 5 microns.

37868

APTIC NO. 60880

Gammill, Adrian M.

ENVIRONMENTAL IMPACT OF SOLID WASTE INCINERATION - THE NASHVILLE STORY. Air Pollution Control Assoc., Chicago, 17p., 1973. (Presented at the Air Pollution Control Association, Annual Meeting, 66th, Chicago, Ill., June 26, 1973, Paper 73-229.)

A central steam heating and chilling plant for downtown Nashville which will use solid waste as a principal source of fuel is described. Initial construction will consist of two 360 ton/day incinerators, a 125,000 lb/hr standby package steam generator, two 7000 ton centrifugal refrigerating units, pollution abatement equipment, and associated equipment required for proper operation of the facility. Solid waste will be dumped into a large storage pit where it can be mixed and fed into an incinerator hopper. Burning in the incinerator will be followed by the dumping off of ash from the last tier into an ash quench pit. Flue gases will pass through the incinerator and into an economizer bank for more heat extraction and will finally exit through a scrubbing system. The flue gases will first pass through a cyclone to remove the larger particulate matter and finally through a wet scrubber to remove the remaining particulate matter in the gaseous pollutants. Cooling tower blood will feed the wet scrubber system. A comparison of the projected particulate and sulfur oxide emissions from this plant with existing facilities is provided along with schematics of the plant design and operation.

37869

APTIC NO. 61082

Gardiner, Arthur W.

AUTOMOTIVE STEAM POWER - 1973. SAE (Soc. Automot. Engrs.) Spec. Pub., no. 21:1-8, March 1973. 28 refs.

CONTROL METHODS

37874

The use of the Rankine or steam engine in automobiles is discussed. The results of current research are summarized with emphasis on problems such as emissions, safety, cold start delay, freezing, choice of working fluid, control systems, and fuel consumption. The steamer's slow, continuous combustion can produce an exhaust gas that is essentially free of unburned hydrocarbons and carbon monoxide in normal steady operation. Nitrogen oxides are produced in increased quantities by the operational changes that reduce hydrocarbons and CO. Several combustors were developed to decrease NOx emissions through air fuel ratios, a turn-down ratio, and a resonant acoustic air atomizing nozzle. Exhaust gas recirculation of 20% further reduces NOx by about 40%. A Rankine cycle powerplant can meet 1976 Federal Standards for emissions. Alternate fluids for steam engines are discussed, but water is still competitive, as is the piston engine. (Author abstract modified)

37870

APTIC NO. 60639

Gobiet, Viktor and Bernhard Oldengott

AIR ANTIPOLLUTION WATER SPRAYS AROUND COKE GUIDE AND QUENCHING CAR OF COKE OVEN BATTERIES. (Vorrichtung zum Vermeiden von Emissionen beim Betreiben von Horizontalkammeröfen auf Kokereien). Text in German. (Ruhrkohle AG, Essen (West Germany)) W. Ger. Pat. 2,116,729. 5p., Sept. 20, 1973. 3 refs. (Appl. April 6, 1971, 6 claims).

Air pollutant emissions during the operation of horizontal chamber units of coke oven batteries can be eliminated on the coke discharge side by a ring water pipe with nozzles on the periphery of the coke guide. A second similar ring pipe is arranged around the rim of the coke quenching car. The nozzles are so directed that the water forms curtains in front of the coke guide and over the quenching car. Here, the water spray can be turned on and off by sections. The whole coke discharge end is roofed over and equipped with an extractor plant.

37871

APTIC NO. 61535

Gotoh, Kenji, Masato Yokota, and Ken-ichi Uchida

EXHAUST EMISSION CONTROL DEVICE FOR INTERNAL COMBUSTION ENGINES. (Toyota Jidosha Kogyo Kabushiki Kaisha, Toyota (Japan)) U. S. Pat. 3,756,027. 4p., Sept. 4, 1973. 10 refs. (Appl. June 4, 1971, 5 claims).

An exhaust emission control device comprising an inner core for causing unburned and noxious contaminants in exhaust gases from internal combustion engines to undergo oxidation to convert them to innocuous gases is described. It contains inlet tubes connected at one end to exhaust ports of the engine and to the cylindrical wall of the inner core tangentially with respect to them to introduce exhaust gas from the exhaust valve into the inner core. It also contains exhaust gas outlet ports from the inner core formed at opposite end walls concentrically in the inner core and axially spaced apart from each other. Previous manifold reactors have the disadvantage that exhaust gas which has not undergone an oxidation reaction yet is mixed in the reaction chamber with exhaust gas which has undergone the oxidation reaction. This prevents the effective utilization of the space in the reaction chamber for the oxidation reaction, and unburned exhaust gas flows from the manifold reactor before sufficient reaction. Another disadvantage is that mixing the exhaust gas with the air is not uniform, so that the temperature rise in the reactor occurs locally, and the device is readily damaged. This invention overcomes these disadvantages by permitting the exhaust gas which has undergone oxidation to be vented through tubes. (Author abstract modified)

37872

APTIC NO. 61443

Grabowski, Witold

OPENING AND OPERATION OF THE CONVERTER GAS DUCT EXTRACTION SYSTEM AT THE LEGNICA COPPER PLANT. (Uruchomienie i eksploatacja

układu odpylającego gazy konwertorowe w Hucie Miedzi w Legnicy). Text in Polish. Rudy Metale Niezależne, 18(10):490-492, 1973.

A new system of converter gas duct extraction at the Legnica copper plant is described which consists of a converter, a cooler, a collector for polluted gas, dry electric filters, a duct with purified gas, a combustion chamber for heating electric filters, an intermediate ventilator, and final ventilators after the filters. The electrofilters have to extract impurities from converter gases up to a value not exceeding 0.2 g/N cu m dust content in the gas. The filters extract gases from the electrofilters and transfer them to a sulfuric acid plant. They have a 80,000 cu/hr capacity. The gas duct transfers the purified gases to the H2SO4 plant. Combustion products are transferred by the ventilator with 0-750 rot/min and 80,000 cu m/hr capacity. The gases containing 12% sulfur dioxide and 12 g/N cu m dust at 900 C are transferred from each converter via the cooler and reach the collector via the intermediary ventilators. The gas obtained is clean. The electrofilters work with 98% efficiency, while 80% of the sulfur is recovered.

37873

APTIC NO. 61279

Graewert, Wolfgang Kave

ELECTRONIC CIRCUIT ARRANGEMENT FOR CONTROLLING AN EXHAUST GAS DECONTAMINATOR. (Texas Instruments Inc., Dallas, Tex.) U. S. Pat. 3,757,519. 6p., Sept. 11, 1973. 5 refs. (Appl. Dec. 6, 1971, 6 claims).

A control circuit arrangement for an exhaust gas decontaminator is described. A voltage generating circuit produces a voltage indicative of the recurrence frequency of the ignition pulses up to a desired limit engine speed, and a differentiating stage provides, from the voltage generator signal, a voltage to a threshold switch indicative of the engine acceleration. The threshold voltage output signal controls operation of the exhaust gas decontaminator. This device is less complicated and more reliable than previous devices which measured the speed and acceleration of internal combustion engines and converted the measurements into control signals for the exhaust gas decontaminator.

37874

APTIC NO. 61400

Grey, Jerry and Auram B. Zant

APPARATUS FOR REMOVAL OF CONTAMINANTS ENTRAINED IN GAS STREAMS. (Morse Boulger, Inc., Corona, N. Y.) U. S. Pat. 3,770,385. 6p., Nov. 6, 1973. 13 refs. (Appl. Nov. 30, 1971, 4 claims).

An incinerator is described which includes a combustion chamber, a flue, and an apparatus interconnecting the two. The apparatus can remove solid and gaseous contaminants from the combustion gases emanating from the combustion chamber which discharge through the flue. The apparatus comprises a first stage separator defining at least one cylindrical chamber with an inlet communicating with the combustion chamber and an outlet for applying a film of liquid-washing medium on the interior wall. It also has a second stage separator defining at least one cylindrical chamber having a tangentially disposed inlet communicating with the outlet of the first chamber, an outlet longitudinally spaced from the inlet communicating with the flue, a means for applying a film of liquid-washing medium on the interior wall, and a means for producing an electrostatic field between a locus with the chamber and the interior wall of sufficient strength to produce a corona discharge for ionizing solid and gaseous contaminants in the gases. The contaminants are thus subjected to combined centrifugal, electrostatic, and gravitational forces which cause the contaminants to be diverted into contact with the film of the liquid-washing and to be removed. This incinerator, unlike previous incinerators, removes sufficient contaminants to meet air pollution codes. (Author abstract modified)

37875

APTIC NO. 61367

Gulyas, James W. and Patrick T. O Kane

REMOVAL OF DUST PARTICLES FROM A DUST LADEN STREAM OF GASES EXITING FROM A MULTIPLE HEARTH FURNACE AND REINJECTION OF DUST PARTICLES INTO THE FURNACE. (Sherritt Gordon Mines Ltd., Toronto (Ontario)) U. S. Pat. 3,775,095. 6p., Nov. 27, 1973. 8 refs. (Appl. June 17, 1971, 3 claims).

Ore is fed into the top of a multiple hearth furnace and, as it travels downwardly through the furnace, is reduction roasted by means of a rising stream of hot reducing gases. Fine ore particles picked up by the combustion gases within the furnace and exiting from it are removed from the gases and reinjected into the furnace at a point at which the degree of reduction of the particles approximates the degree of reduction of the ore which passes downwardly at the point. To prevent the injected particles from being carried upwardly by the partial combustion gases, the particles are injected in the form of a continuous plug. This process is an improvement in the method of roasting comminuted nickel-bearing laterite and garnierite ores to effect heating and reduction of the ore. (Author abstract modified)

37876

APTIC NO. 61332

Haas Teunis Karel de and Johannes Gerardus Toenis

REMOVAL OF ACID GASES FROM GASEOUS MIXTURES. (Verfahren zur Entfernung von sauren Gasen aus gasförmigen Mischungen). Text in German. (Shell Internationale Research Maatschappij N.V., Hague (Netherlands)) W. Ger. Pat. Appl. 1,544,123. 6p., April 19, 1973. 2 refs. (2 claims).

A process for the removal of acid gases, such as hydrogen sulfide and carbon dioxide, from gaseous mixtures, such as natural gas, and refinery gases, is described. The gaseous mixture to be purified is treated with a liquid absorbent consisting of a mixture of 10-50% diisopropanolamine and 50-10% N-methylpyrrolidone by weight, and optionally containing water.

37877

APTIC NO. 61136

Haertel, Guenter

WHAT CARBURATORS CAN ACHIEVE. MIXTURE FORMATION AND POLLUTANT EMISSION OF AUTOMOBILES EQUIPPED WITH OTTO ENGINES. (Was Vergaser leisten koennen. Gemischbildung und Schadstoffemissionen von Fahrzeug-Ottomotoren). Text in German. VDI (Ver. Deut. Ingr. Nachr. (Berlin)), 27(50):10, 15, 1973.

The question of whether low pollution from automobiles can be accomplished with new carburetors is investigated. The concepts of surplus air, delayed ignition, afterburning, and CVCC (compound vortex controlled combustion) stratified layer operation are considered in this regard. Carburetors offer the most economical solution to the pollution problem.

37878

APTIC NO. 61341

Hardison, Leslie C.

METHOD OF COLLECTING SUB-MICRON PARTICLES FROM A HOT GAS EFFLUENT STREAM. (Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,755,990. 7p., Sept. 4, 1973. 4 refs. (Appl. May 8, 1972, 8 claims).

A method of collective sub-micron particles from a hot gaseous effluent stream is described. The effluent is mixed with a hot saturated gas stream and then subjected to rapid cooling to produce a fog and condensation of water droplets around solid particles in the gas stream. The resulting gas stream with enlarged particles is then passed to a wet scrubber so that particles can be removed and a cleaned gas stream discharged from the system. This method is cheaper and more efficient than prior methods which include wetting and agglomeration of particles or electrostatic agglomeration followed by scrubbing or electrostatic precipitation. (Author abstract modified)

37879

APTIC NO. 61522

Hashimoto, Kiyotaka

THE FUNCTIONAL MECHANISMS OF ELECTRICAL DUST COLLECTORS. (Denki shujinki ni okeru shujin tokusei). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(11):1121-1131, Nov. 1973. 12 refs.

The dust collection characteristics of electric dust collectors (EP) are outlined. The EP has a high dust collection efficiency based on the electrostatic cohesion effect for the collection of very fine dusts. Airborne miscellaneous bacteria can be easily collected by EP, and the bacteria collected at the electrode are killed by corona discharge. To effectively use the dust collecting characteristics to EP, characteristics of the stack gas, the flow rates of the gas, the electrical properties and shape of the dust, the distribution of grain sizes, and the concentration of dust must be studied. The EP can be improved by combustion with the other types of dust collectors and can be made more economical.

37880

APTIC NO. 61220

Hatanaka, Toshiki and Naotaka Yanase

LOW NOX BURNERS TO BE USED FOR HEATING FURNACES. (Kanetsu yo tei-NOx bana ni tsuite). Text in Japanese. Kogyo Kanetsu (Ind. Heating), 10(6):359-365, Nov. 1973.

Methods for the decrease of nitrogen oxides emissions are reviewed including the description of a new low NOx furnace. Possible methods discussed include the use of fuels flammable at lower temperatures, the combustion of fuels with low excess air, two-stage combustion, off-stoichiometric combustion, recirculation of discharged gases, reduction of thermal load of the combustion chamber, lowering the temperature of preheating of the air, improvement of the shape of furnaces, improvement of the arrangement of burners, injection of steam, injection of water, division of flames, the use of small capacity burners, and the improvement of the structure of the burners. The above mentioned newly developed furnace makes use of the low-NOx burner made by the Surface Combustion Division of the Midland Ross Corp. The NOx content of the gas discharged from this burner is about 1/2-1/3 that of ordinary burners. The furnace is 2 ft in inside diameter and 7 ft long. The fuel is natural gas. The combustion rate is 1 million BTU/hr or about 250,000 kcal/hr. The theoretical air-fuel ratio is 9.38:1. The excess air ratio is 1.07. Larger furnaces with capacities of 2500 kg/hr and 400 kg/hr are presently under construction.

37881

APTIC NO. 61307

Hausberg, Gerhard, Georg Krueger, and Karl-Martin Bentgraf

APPARATUS FOR REMOVING SULPHUR OXIDES FROM INDUSTRIAL WASTE GAS. (Firma L. Bischoff Bau kompletter Gasreinigungs- und Wasserrückhulanlagen KG, Essen (West Germany)) U. S. Pat. 3,773,472. 4p., Nov. 20, 1973. 8 refs. (Appl. Feb. 23, 1972, 2 claims).

An industrial waste gas containing sulfur dioxide and sulfur trioxide can be cleaned by mixing it with an alkaline powder (or a powder containing finely divided particles of solids from the furnace) and by saturating it with a wash liquid consisting primarily of water admixed with an alkali or alkaline salt. Then the saturated gas is adiabatically and continuously expanded to precipitate the wash liquid around the powder particles. The precipitated droplets are collected from the cleansed gas and, if desired, recirculated as wash liquid after sedimentation of the solids. The gas and wash liquid are passed through a venturi clearance around a body above which a cold-water spray is provided. This method is cheaper and more efficient than prior methods which used an activated carbon or other adsorbent filter to remove sulfur oxides. (Author abstract modified)

37882

APTIC NO. 60920

Hayford, John S., Lester P. VanBrocklin, and Mark A. Kuck
STAUFFER AQUACLAUS TM PROCESS. Preprint, American Inst. of Chemical Engineers, New Orleans, 25p., 1973. (Presented at the American Institute of Chemical Engineers, National Meeting, 74th, New Orleans, La., March 11-15, 1973.)

A general process description, the process chemistry, process economics, and pilot plant operating data and results are presented for the Stauffer AQUACLAUS-TM process, a simple and efficient absorption method capable of reducing sulfur dioxide levels in diverse waste gas streams to low limits. Incineration converts all sulfur compounds in the tail gases to SO₂ which is then absorbed in the AQUACLAUS solvent. The SO₂-loaded solution is next contacted with hydrogen sulfide, and sulfur is formed and recovered. The treated gas contains less than 100 ppmv of SO₂; a small amount of Glauber Salts are obtained as a by-product. A pilot plant has been in successful operation for over a year treating a portion of the tail gas from a commercial Claus unit; percent removal of the SO₂ (bisulfite) in the reactor has exceeded 99%. Typical applications for the process include: refineries, power plants, smelters, and Claus plants. (Author abstract modified)

37883

APTIC NO. 61339

Hess, Howard V. and Edward L. Cole

COKING OF SPENT PULPING LIQUORS WITH SUBSEQUENT SO₂ ABSORPTION. (Texaco Inc., New York) U. S. Pat. 3,770,574. 4p., Nov. 6, 1973. 3 refs. (Appl. Nov. 12, 1969, 4 claims).

Spent sulfite liquor from a sulfite mill digester can be cooked with subsequent sulfur dioxide absorption. The spent liquor is preheated and then heated in a closed system at a temperature in the range of 450 to 700 F under autogenous pressure for a period of 0.5 min to 6 hr to form an effluent liquid and a sulfur-containing coke. The coke is burned to furnish steam for the process and flue gas from which the SO₂ evolved is absorbed by the effluent liquid, thus forming additional cooking liquor which is recycled to the digester. Volatile gases from the digester are also oxidized to SO₂ which is combined with that formed by burning the coke. Unlike previous, similar processes, this process provides a closed cycle which eliminates the water and air pollution problems encountered in the sulfite pulping processes. The invention also provides for the advantageous use of coke and decoked liquor in the sulfite pulping process. (Author abstract modified)

37884

APTIC NO. 60692

Hoekstra, James

CATALYSTS FOR MOTOR EXHAUST GASES. (Verfahren zum Herstellen eines Katalysators zur Nachverbrennung von Abgasen). Text in German. (Universal Oil Products Co., Des Moines, Iowa) W. Ger. Pat. Appl. 1,767,729. 10p., Feb. 15, 1973. 1 ref. (3 claims).

Procedure for the preparation of a catalyst for the afterburning of lead-containing motor exhaust gases, containing supported platinum compounds, carboxylic acids and calcium, and strontium or barium derivatives, is described. The catalyst is prepared by impregnating a porous alumina carrier with an aqueous solution of a platinum compound at a rate of 0.01-10% by weight, and previously or simultaneously impregnating the alumina support with 0.1-1.5% dicarboxylic acid. Then, the supported material is dried, calcined, and reduced. In addition, the support is impregnated with an aqueous solution of a calcium, strontium, or barium compound, e.g., hydroxide, at an expenditure of 1-20% by weight based on support; either before or after impregnation with the platinum compound and the dicarboxylic acid.

37885

APTIC NO. 61394

Hosho, Yukio, Yoshishige Oyama, Teruo Yamauchi, and Torazo Nishimiya

EXHAUST EMISSION REDUCTION WITH LEAN MIXTURE (I) - EARLY FUEL EVAPORATION DEVICE. (Kihaku kongoki ni okeru haiki joka no kenkyu (Dai I-po) -- Nenryo kika sokushin sochi no kento). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 12(145):11-20, Dec. 1973. 12 refs.

Automotive emissions of hydrocarbons, carbon monoxide, and nitrogen oxides can be reduced by improving the firing of lean fuel mixtures. Research on innovations of feed and ignition methods includes: methods of producing a uniform air-fuel mixture, ignition devices which can fire a lean mixture, a multiple ignition system which will prevent power decreases and increases in fuel consumption, a reactor to accelerate oxidation of CO and HC in exhaust gases, and engine performance considering the above variables. The air-fuel ratio can be raised to at least 20 without fear of misfiring when a uniform mixture is completely vaporized by utilizing exhaust heat, thereby greatly reducing exhaust emissions. This method improves exhaust emissions during all changes in driving mode.

37886

APTIC NO. 60993

Humhal, Miloslav

DUST SEPARATORS IN STEEL MILLS USING OXYGEN-FED CONVERTERS. (Odprasovaci zarizeni v ocelarnach intenzifikovanych kyslikem). Text in Czech. Hutnické Listy (Prague), 28(11):781-791, 1973. 6 refs.

The problem of separating the fine dust from the waste gases of steel mills has become greater with the use of the basic oxygen process (BOP) which produces more dust than previous methods. Various types of separators such as venturi scrubbers, bag filters, electrostatic precipitators, or carbon black absorption reduce the amount of dust to acceptable levels. In 1971, 87.3% of the dust was removed and it is hoped that by 1985, this rate will reach 99.5%, despite an anticipated increase of 38% in steel production. Utilization of the collected dust is one of the remaining problems requiring a solution.

37887

APTIC NO. 60429

Ikegami, Jun, Ikuo Kawai, and Yuji Fujimura

FORMATION OF OXIDES OF NITROGEN IN DIESEL ENGINE (WITH TURBULENCE CHAMBER). (Diizeru kikan ni okeru chissosankabutsu no seisei (Uzushitsu-shiki no bari)). Text in Japanese. Nippon Kikai Gakkai Ronbunshu (Trans. Japan. Soc. Mech. Engrs.), 39(327):3444-3449, Nov. 1973. 11 refs.

A double-cell engine emits less oxides of nitrogen than a direct injection type. Using a swirl chamber engine that permits systematic changes of the various elements of the engine, the NO_x formation mechanism in the engine was investigated to find means for possible reduction of the NO_x emission. The engine used was a four-cycle, one-cylinder, water-cooling diesel engine with a special cylinder head. The swirl chamber was composed of upper and lower sections so that the injection direction and the communicating pore area might be changed. The reference operating conditions for this experiment included fuel injection direction set at 15 deg in the same direction as the air flow, the compression ratio at 16.4, the volume ratio of the antechamber against the overall combustion chamber 50%, the communicating pore area ratio 1.0%, the jet nozzle with the injection spread angle at 8 deg, the starting injection pressure 120 kg/sq cm, and the operating speed at 1500 rpm. The fuel was grade-A heavy oil. Under the above operating conditions, both the equivalent ratio and the fuel injection timing were changed to study their effects on NO_x formation. The temperature of the cooling water was also varied. The study made on NO_x formation in the engine by systematically changing such parameters as those mentioned above reveals that cooling the flame in the main chamber has

much to do with control of the NO_x formation. Direction of the fuel injection in the swirl chamber also affects the NO_x formation. This effect is much greater in the range of smaller equivalent ratios than in that of greater ratios.

37888

APTIC NO. 60355

Inoue, Kiyoshi

DISPERSION/CONCENTRATION METHOD OF PARTICULATES IN AIR. (Kichu biryushi no bunsan shuketsu hoho). Text in Japanese. (Inoue Japacks Research Inst., Yokohama (Japan)) Japan. Pat. Sho 48-42103. 4p., Dec. 11, 1973. (Appl. Aug. 25, 1962, 1 claim).

This invention consists of a method for the aggregation of aerosol particles into large agglomerates in order to improve dust removal efficiency. Fine particulates suspended in air are electrically charged and applied to either an electro-vibrational field and/or sound pressure so that they may be dispersed, concentrated, or caused to turn. They start to vibrate when they enter the electro-vibrational field. Amplitude and phase delay of individual particles varies with the size of the particles. When the vibration-exciting field strength and frequency are set so that the average amplitude is equal to or greater than the average distance between individual particles the frequency of collision between the particles is increased to the point that aggregation occurs.

37889

APTIC NO. 56925

Ishihara, T.

ANTI-NO_x MEASURES FOR INDUSTRIAL BOILERS. (Sangyo yo boila no NO_x taisaku). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(11):1085-1090, Nov. 1973.

Nitrogen oxides control for industrial boilers is reviewed. A suitable burner can reduce NO_x 20-30%. A higher temperature for the preheated air increases the NO_x emissions. Both excess air and insufficient air are not successful. Complete combustion is achieved by two-stage combustion, which blows additional air into the center of the furnace and reduces local temperatures.

37890

APTIC NO. 61539

Iwai, Shigehisa, Bishako Haruyama, Yuji Sato, and Hiroshi Nagata

PRETREATMENT OF EXHAUST GAS BY ULTRASONIC WAVES AND STEAM. (Suijoki narabini choonpa ni yoru haigasu no maeshori ni tsuite). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 2(11):795-802, Nov. 1973.

An effective means to increase the efficiency of dust collection is to enlarge the aerosols, such as dust, mist, and fumes and the effects of pretreatment with steam and ultrasonic waves was experimentally examined. As control aerosols, soot produced by combustion of common oils and Kaolin clay, which has a comparatively, even grain size, were selected. The coagulation effect of steam was very great for hydrophilic dust, and considerable for lipophilic dust. In general, the coagulation effect of steam increases the efficiency of a dust collector, but dust collection efficiency goes down with the decrease of the amount of steam relative to the unit amount of gas so the temperature must be sufficiently raised. The use of ultrasonic waves doubled dust collection efficiency in cyclones. At 10 KHz, the dust coagulation effect began to appear at about 130 dB, and at 17 KHz, it began to appear at about 117 dB, reaching a maximum at 120 dB. The effective concentration of dust for pretreatment was about 1.7 - 0.7 g/cu m and the concurrent use of steam and ultrasonic waves is most effective.

62

37891

APTIC NO. 61277

Iyengar, Madhur Srinivas, Rezaul Haque, Ranjit Kumar Chakrabarti, Manindra Lal Dutta, and Abhay Kumar Singh

PROCESS FOR THE PRODUCTION OF CARBON BLACK FROM COAL. (Council of Scientific and Industrial Research, New Delhi (India)) U. S. Pat. 3,773,904. 3p., Nov. 20, 1973. 7 refs. (Appl. Aug. 10, 1971, 8 claims).

A process for producing carbon black from crushed coal is described. The coal is carbonized in a fluidized bed in a refractory reactor at 1200 C. The char is removed in a cyclone separator and the remaining flue gases laden with carbon black are passed through a water scrubber, an electrostatic precipitator, and a cyclone to remove and collect the carbon black. Processes for preparing carbon black from gaseous or liquid hydrocarbons are expensive and may only be used in limited areas where the particular gaseous or liquid hydrocarbons are available. Processes have been proposed to prepare carbon black from the cheaper coal, but they would emit carbon black in the flue gases and have additional costs for the beneficiation of the coal and for the final recovery of the carbon black by screening. This invention is an improved process which is free from these drawbacks. It eliminates the steps of beneficiating the raw coal and screening the char to recover carbon black, eliminates further treatment of the final product, does not insist upon any particular degree of fineness for the coal before carbonization, uses a cheap, available product, gives a product of improved quality, has a less expensive installation cost, and reduces air pollution by recovering carbon black from the flue gases. (Author abstract modified)

37892

APTIC NO. 61282

Johnston, Robert A., Daniel Docherty, and Robert L. Arrington

DE-MISTER DEVICE. (Caledon Engineering, Inc., Fairfield, Conn.) U. S. Pat. 3,757,493. 7p., Sept. 11, 1973. 18 refs. (Appl. June 8, 1972, 1 claim).

A de-mister device is described comprising essentially one or more belts of open mesh or open weave material, resistant to the corrosion and temperature conditions of its operating environment. It is supported by a pair of power-driven pulleys or rollers respectively journaled in a pair of receptacles, supported by a framework to connect, through lateral openings with corresponding openings on opposite sides of a duct or stack, the belts passing through the openings. It has a manifold or lance within each receptacle, extending parallel to each pulley or roller adapted to direct pressurized jets of air, steam, or other fluid against the belts to remove particulate material accumulated on the belts and direct it toward the base of the receptacle. Preferably, one length of belt between the pulleys is reversed by passage over a guide bar between the pulley and the adjacent opening to the duct or stack to maintain a 180 deg twist between the roller and the guide bar -- such twist being maintained at both ends of the length of belt if the belt itself includes no twist, and at one end if the belt itself includes a twist to constitute it a Moebius surface. In this way, the same surface of the two lengths of belt between the supporting pulleys or rollers face the oncoming gas stream in the duct or stack. This de-mister can be used to remove particulate matter from exhaust gases which have passed through a scrubber, but may still contain some particulate matter. (Author abstract modified)

37893

APTIC NO. 61182

Kabe, Toshiaki

AIR POLLUTION BY SULFUR OXIDES - STATE OF RESEARCHES ON HYDRODESULFURIZATION AS A COUNTERMEASURE. (Io sankabutsu ni yoru taiki osen-sono taisaku to shite no suisoka datsuryu hanna no kenkyu no genjo). Text in Japanese. Shokubai (Catalyst), 13(6):170-181, 1973. 58 refs.

The state of research on hydrodesulfurization catalysts is reviewed. The main catalysts examined are molybdenum, and the combination of Mo, cobalt, and alumina. Since desulfurization is achieved by the charge transfer between molybdenum and sulfur compounds, addition of a material which enhances charge transfer of the catalyst will produce a highly active catalyst. But before such studies began to be made, the combination of Mo, Al₂O₃ plus Co or nickel has been in use for some time. The best results are believed to be produced when the MoO₃ content is 6.5-12 wt% and CoO, 2-5 wt%. Alumina seems to act as a carrier, but how free Mo affects the catalytic action is still in question. Generally, the higher the boiling point of the petroleum fraction, the harder desulfurization is for these reasons: the fraction contains many sulfur compounds that are hard to desulfurize; large amounts of nitrogen and oxygen compounds interfere with the desulfurization reaction; carbon is reduced on the surface of the catalyst, and such fraction contains compounds of organic metals such as vanadium and Ni. A direct desulfurization system utilizing these catalysts will yield 80-70% desulfurization at best, and the product contains about 1% of sulfur. A Co-Mo-Al₂O₃ catalyst can produce close to 100% desulfurization when heated to 460 C, but the fuel drastically decreases. Asphaltene portions almost disappear at 440 C. Also, when the desulfurization rate is more than 80%, the hydrogen consumption increases drastically with a proportional increase in cost.

37894

APTIC NO. 61541

Kammholz, Guenter and Gerd-Arthur Mueller

EXPERIENCE WITH CONCEPTION AND ERECTION OF LARGE PLANTS ILLUSTRATED BY THE EXAMPLE OF HEAVY OIL GASIFICATION WITH AMMONIA AND METHANOL PRODUCTION. (Erfahrungen bei der Konzeption und dem Bau von Grossanlagen dargestellt am Beispiel einer Schweröelvergasung mit Ammoniak- und Methanol-Produktion). Text in German. Erdöl Kohle-Erdgas-Petrochem., 26(12):695-700, 1973. 2 refs.

Production of ammonia was originally based on the use of coking gas. However, because of the high energy demand, this method is no longer feasible. Residues from vacuum distillation were the only available raw material for gasification. The gas obtained was to be used for the synthesis of ammonia, methanol, and other alcohols. For gasification of residual oils the Shell partial oxidation process was selected. With this method the soot is extracted with residual oil from water and pressed into pellets by adding oil. The pellets consist of 75% oil, 15% soot, and 10% water. They can be returned to the gasification process. In the present case they are burned in a neighboring coal-fired power plant. The reaction heat is used in a connected boiler. Since the gas was to be used both for ammonia synthesis and for methanol synthesis a carbon monoxide-rich desulfurized gas was needed. A pressure of 60 bar was selected for the residual oil gasification. Because of this pressure a cold scrubbing process with methanol is applied combined with a Lurgi-rectisol scrubbing process for removal of hydrogen sulfide and carbon dioxide.

37895

APTIC NO. 61552

Kasaoka, S. and K. Tanaka

CATALYTIC OXIDATIVE ADSORPTION OF SO₂ BY ACTIVATED CHARCOALS. (Nisanka iou no kasseitan niyori seashoku sanku kyuchaku). Text in Japanese. Preprint, Chemical Society of Japan, Tokyo, p. 144-145, 1973. (Presented at the Symposium on Catalysis, 33rd, Hiroshima, Japan, Oct. 10-11, 1973.)

Adsorption of sulfur dioxide-nitrogen and sulfur trioxide-nitrogen mixtures on activated charcoal was studied in the absence of oxygen and water. Adsorption of the SO₃-N₂ mixture was far more rapid and efficient than that of the SO₂-N₂ mixture. In the adsorption of sulfur oxides, the oxidation of SO₂ to SO₃ is a rate-determining step and that the activated charcoal should possess oxidative catalytic activity. Modifica-

tion of charcoal surface by pretreatment and incorporation of oxidation catalysts such as platinum, rhodium, ferric oxide, and cupric oxide were examined. The mixture consisted of 2.5% SO₂, 2.5% O₂, and 95% N₂ and adsorption was measured at 90-180 C with a gas flow rate of 600 N cu cm/min. High temperature treatment at 900 C for 3 hr in an N₂ stream and incorporation of Pt largely increased the rate and amount of SO₂ adsorption. The presence of H₂O ranging 2.5 to 10% promoted the SO₂ adsorption and the rate of adsorption increased with increasing H₂O vapor pressure. Regeneration of activated charcoal was successfully carried out by desorption at 850 C for 0.5 hr in an N₂ stream, accompanied with a weight loss of 10-20 mg/g. An increase in the adsorption capacity of the active charcoal by high temperature treatment is not associated with the modification of micropore structure, but rather with the oxidative function of the charcoal surface.

37896

APTIC NO. 61148

Kato, G.

ODOR CONTROL BY MEANS OF CATALYTIC OXIDATION AND ITS PROBLEMS TO BE SOLVED. (Shokubai sanku niyori dasshu hoho to sono mondaiten). Text in Japanese. Akushu no Kenkyu (Odor Res. J. Japan), 3(12):37-51, Sept. 1973. 22 refs.

Odor control by means of catalytic oxidation is briefly reviewed. The oxidation efficiency, basic structure of catalytic oxidation devices, costs, operating conditions, and catalyst poisoning are discussed. The oxidation efficiency of a catalytic oxidation device loaded with platinum-alumina was tested on aromatic hydrocarbons. Removal efficiencies were 61-80% for C₁-C₅ HC, 71-84% for benzene, 58-94% for toluene, 80% for other aromatics, and greater than 92% for total HC. The results obtained by A. C. Harkness and F. E. Murray for catalytic oxidation of sulfur containing exhaust emissions were described. Photochemical oxidation has been studied as a means of odor control, but the possibilities of its industrial application are remote. Dilution of odors by atmospheric diffusion is also briefly discussed.

37897

APTIC NO. 61520

Kawakami, Waichiro and Keita Kawamura

DISPOSAL OF HEAVY OIL FLUE GAS BY ELECTRON BEAM. (Denshisen ni yori juyū nensho haigasu no shori). Text in Japanese. Denki Kyokai Zasshi (J. Japan Elec. Assoc.), 60(12):29-36, Dec. 1973. 17 refs.

In 1972 the Ebara Manufacturing Company Central Research Institute and the Japan Atomic Energy Research Institute started a joint study to deal with the technical problems in the development of a stack gas disposal process using radioactive radiation. Irradiation with electron beams of the gas from the burning of class B heavy oil removed the sulfur dioxide and nitrogen oxides, leaving only sulfuric acid mist and solids, which can be easily removed with an electrostatic precipitator. A Cockcroft-Walton electron accelerator delivered a dose of 100,000 to 6,000,000 rads/sec at an electron energy of 1 to 3 MeV. The reaction temperature was 7.5 to 245 C and the retention time 0.1 to 90 sec. The stack gas composition was 180 to 930 ppm SO₂ and 80 to 1300 ppm NO_x. At the same dose, the higher the dose rate, the higher the removal rate of SO₂, indicating a higher efficiency of energy utilization at the higher dose rate. The products of the process were sulfuric acid and solids, the composition of which proved to be sulfur, nitrogen, oxygen, and hydrogen.

37898

APTIC NO. 61317

Kawamura, Koichi

DESULFURIZATION OF FUEL OILS AND THE DECOMPOSITION OF HEAVY OILS. (Nenryo-yu no tei-oka to jushitsu-yu no bunkai). Text in Japanese. Nenryo oyobi Nensho (Fuel and Combustion), 40(12):1145-1160, Dec. 1973. 17 refs.

Hydrogenation desulfurization of heavy oils and methods of decomposition of heavy oils to remove sulfur are discussed. Hydrogenation desulfurization of heavy oils is performed by the indirect, direct, or hybrid desulfurization method. The amount of oil that remains after desulfurization varies depending upon the origin of the crude oil. The amount of the residual oil and its sulfur content varies between 44 and 56% and 1.5 and 2.6%, respectively, by the indirect method, which is the most popular at present. The decomposition of heavy oils is helpful for desulfurization because the desulfurization of resulting gases is easily performed. Decomposition is done by the hydrogenation, catalytic decomposition, or by thermal decomposition. Gas-forming desulfurization is accompanied by the problem of limited uses for the gaseous products. Therefore, it is preferable to prepare as much liquid fuel as possible by the hydrogenation desulfurization, and then change residual asphaltene and coke into gaseous fuel.

37899

APTIC NO. 61145

Kawase, Buntaro, Iwao Kojima, and Kunio Otani

METHOD FOR REMOVING MERCURY VAPORS CONTAINED IN GAS. (Kitaichu ni fukumareru suigin joki jokyoho). Text in Japanese. (Showa Denko K.K., Tokyo (Japan)) Japan. Pat. Sho 48-43257. 2p., Dec. 18, 1973. (Appl. June 23, 1970, 1 claim).

The industrial demand for high-purity hydrogen gas is increasing, and hydrogen gas obtained as a by-product during electrolysis of common salt gives the highest purity. The problem with this hydrogen gas is that it contains mercury vapors. None of conventional methods for removal of the mercury vapors provide a satisfactory result (for technical or economic reasons). An acid solution containing persulfate ions possesses excellent absorption speed and capacity for removal of mercury vapors in a gas. The acid solution can be a water solution of sulfuric acid, nitric acid or oxalic acid. In an embodiment of this invention in which a 20% water solution of sulfuric acid containing 1% persulfuric acid ((NH₄)₂S₂O₈) was used to scrub the hydrogen gas containing mercury vapors, the removal efficiency was very high; the mercury concentration of 12 mg/cu m of entrance to the packed-up absorption tower was reduced to 0.01 mg/cu m at its exit.

37900

APTIC NO. 61472

Kikuchi, Tadashi, Tokio Abe, and Akira Sone

STUDY ON ODOR CONTROL MEASURES OF FISH INTESTINES/BONES PROCESSING PLANT, 1. ESPECIALLY OF THE ONE HANDLING WHALES AND SHARKS. (Gyocho-kotsu shori kojo no boshu taisaku ni kansuru kenkyu, 1. Tokuni kujira, same to shoriyo ni tsuite). Text in Japanese. Preprint, Japan Environmental Sanitation Center, Kawasaki, p. 83-84, 1973. 2 refs. (Presented at the National Meeting on Environmental Sanitation, 17th, Nagoya, Japan, Oct. 18-19, 1973, Paper 6.)

An intestine/bone processing factory for whales and sharks emits more offensive odors than for fish. The odors from the drier of a whale/shark plant were analyzed, and possible deodorization methods investigated. Water solutions of hydrogen chloride, sodium hydroxide, and hydrogen peroxide were used to deodorize the gas. Exhausts from one plant gave an odor intensity of 16,000, a trimethyl amine concentration of 5.5 ppm, and an ammonia concentration of 121 ppm before deodorization treatment. After treatment with 30% H₂O₂, the odor intensity was 1500; after treatment with NaCl, the odor intensity was 500; after treatment with HCl, the odor intensity was 2000 and all the trimethyl amine and ammonia were removed. The whale/shark plant gave off 10 to 100 times more ammonia and somewhat more trimethyl amine than fish plants.

64

37901

APTIC NO. 61362

King, Jack B.

VENTURI VACUUM RESPONSIVE EXHAUST GAS RECIRCULATION CONTROL SYSTEM. (General Motors Corp., Detroit, Mich.) U. S. Pat. 3,774,583. 7p., Nov. 27, 1973. 1 ref. (Appl. May 8, 1972, 2 claims).

An exhaust gas recirculation control system wherein a vacuum motor responsive to carburetor venturi vacuum varies the loading on a valve controlling air bleed to a vacuum-operated servo unit which positions an exhaust gas recirculation control valve to provide a recirculation rate proportional to venturi vacuum and engine air consumption is described. This method reduces nitrogen oxide emissions by internal combustion engines. Greater NO_x reduction is achieved with minimal deterioration of vehicle drivability than with conventional recirculation systems by keeping the amount of recirculated exhaust gas in proportion to engine air consumption throughout the normal operating range of the engine and by stopping recirculation during engine idling and operation at or near wide open throttle.

37902

APTIC NO. 60550

Koch, Christian

DEVICE FOR THE ABSORPTION OF GASES OR GASEOUS COMPONENTS FROM GASEOUS MIXTURES. (Vorrichtung zur Absorption von Gasen oder von Komponenten aus Gasgemischen). Text in German. (Siemens AG, Berlin (West Germany)) W. Ger. Pat. 1,916,316. 5p., Dec. 6, 1973. (Appl. March 29, 1969, 5 claims).

A device for the absorption of gases or gaseous components from gaseous mixtures, such as of fuel cell reactants, is described. Both the gas to be treated and the adequate absorbent liquid are admitted into a plate column which may be subdivided into two or more subcolumns connected with each other either in counterflow or in parallel flow, while the flow direction of the gaseous and liquid phases within one column is always the same. The column plates are of highly porous, sintered material, with open pores, with a pore volume of at least 50%, and with openings in them. The ratio of the opening diameter to the plate thickness varies from 0.03 to 0.3, while the ratio of the plate thickness to the plate diameter is greater than 0.1. Part of the absorbent liquid is retained by the plates. The column is provided with inner or outer runoff collectors.

37903

APTIC NO. 61550

Komatsu, Masahiro

OPERATION OF DIRECT COMBUSTION TYPE EXHAUST GAS DEODORIZATION DEVICE AND ASSESSMENT OF ITS PERFORMANCE. (Chokunen hoshiki ni yoru haigasu dasshu sochi no kado to sono koka hantei). Text in Japanese. Preprint, Japan Society for Safety Engineering, Tokyo, p. 111-115, 1973. (Presented at the Safety Engineering Studies Presentation Meeting, 6th, Tokyo, Japan, Dec. 6-7, 1973, Paper 31.)

The odorous gas produced as a result of the sewage oxidation process at a wet type sewage treatment plant is being controlled by a direct combustion deodorization device. The conventional process includes washing with water, washing with heavy oil, and treatment with active carbon, giving incomplete deodorization. In the new device, the odorous oxidation gas is centrifugally processed for removal of mist, preheated to 300 C in the heat exchanger, and is deodorized at 550-900 C in the combustion furnace. Using some of the air from the aeration tank to lower the temperature, the gas, together with the combustion gas, goes into the shell side of the heat exchanger. Upon leaving the shell, the temperature is about 350 - 450 C. The gas is mixed with the exhaust gas from the aeration tank as it moves on to the chimney, and the temperature is lowered to about 200 C by the time the gas reaches the entrance to the stack. The chimney stands about 60 m high and the gas temperature at its exit is about 160 C. The main components of

the gas before treatment with this deodorization device are listed. The deodorization effects of the device as measured by gas chromatography are shown. They are 50.9% for tricarbon (C3), 100% for tetracarbon (C4), 100% for acetaldehyde, 100% for methyl ethyl ketone, 51.2% for benzene, and 100% for toluene.

37904

APTIC NO. 61448

Konada, Tatsuo

SULFURIC ACID PRODUCTION FROM LOW CONCENTRATION SMELTER GAS. (Teinodo seiren haigasu kara ryusan no seizo). Text in Japanese. Ryusan to Kogyo (Sulfuric Acid Ind.), 26(2):25-28, Feb. 1973. 4 refs.

The stack gas desulfurization process which has been in operation at the Onahama Smelting Plant since May 1971 and uses a process of catalytic sulfuric acid conversion is described. The exhaust treated contains 2.2% sulfur dioxide, 6.1% oxygen, 8.0% carbon dioxide, 83.8% nitrogen, and 18.5% water and has a streaming velocity of 1500 N cu m/min and a temperature of 300 C. The yield of sulfuric acid is 96% and after dust and mist removal the released gas contains 30 to 50 ppm SO₂, a 99.7% desulfurization efficiency. The process utilizes two-stage cooling with sea water as the first coolant and freezer water the second. It features drying and absorption towers, heat compensation by exhaust gas recirculation, and corrosion prevention measures for the heat exchanger. A 20% increase in copper refining has been accomplished due to the installation of the process in the smelting furnace.

37905

APTIC NO. 61434

Kondo, Masatoshi

ELIMINATION OF NOX BY THE USE OF ULTRASONIC ENERGY. (Cho-onpa energy ni yoru NOx no jukyo ni tsuite). Text in Japanese. Kankyo Sozo (Environ. Creation), 3(12):81-91, Dec. 1973. 5 refs.

The main features of ultrasonic waves are energy emitted from the alternate change of ultrasonic irradiation pressures, the energy effect brought about by the expansion and compression of the medium, and the cavitation effect. Possible applications of ultrasonics to the chemical industry, application to the treatment of nitrogen oxides, and the effect of the wave on the molecules are given. Of these applications, the application to the treatment of NOx is the most promising. When a gas containing 18% water vapor, 70% nitrogen gas, 3-5% oxygen, 10-12% carbon dioxide, and 100-500 ppm NOx was passed through an apparatus equipped with an ultrasonic wave emitter and active carbon, the NOx content of the gas was only 7 ppm at most. The gas was passed through the apparatus at a rate of 30 l/min at 80-120 C. The ultrasonic power was about 10-30 watt/sq cm. The frequency of vibration was 300 kHz-10MHz. The passage of the gas through the apparatus containing active carbon without the ultrasonic wave, did not decrease the NOx content. The activation of molecules by the application of ultrasonic wave is attributable to the increase of kinetic energy, which increases the number of collisions with other molecules.

37906

APTIC NO. 61453

Korper, George W., III

LOW POLLUTION, HIGH EFFICIENCY PRIME MOVER SYSTEM AND PROCESS. (Conservor, Inc., New Haven, Conn.) U. S. Pat. 3,769,788. 20p., Nov. 6, 1973. 4 refs. (Appl. March 9, 1972, 39 claims).

An engine system is described which obtains the maximum useful energy output from an internal combustion process by maintaining a substantially constant volume within a combustion zone during completion of the combustion process and by providing for nearly complete expansion of heated gas after completion of combustion. The engine includes a piston mounted for movement within the chamber, and the piston is retarded from initiating an expansion stroke movement until nearly theoretical maximum pressure and heat conditions are

developed within a combustion zone within the chamber. Thereafter, the piston is released to apply a motive force to a volume of hydraulic fluid contacted by the piston within the same chamber. The expansion stroke of the piston is substantially longer than its compression stroke. A specific embodiment provides for constant pressure delivery of hydraulic fluid by auxiliary hydraulic devices which function to maintain a substantially constant force differential on opposite sides of the piston during its expansion stroke travel. The new practical working cycle is designated as the Korper cycle. It extracts as mechanical energy, thermal energy wasted in previous internal combustion engines such as the Otto or Atkinson cycles by providing for complete combustion prior to expansion and a longer expansion than compression stroke. The increased efficiency and improved combustion lower air pollutant production. (Author abstract modified)

37907

APTIC NO. 61565

Krylenko, V. I., S. M. Belokon, and V. P. Pototskiy

THE EFFECT OF THE COMPOSITION OF THE LIMESTONE SUSPENSION ON THE EFFICIENCY OF SULFUR DIOXIDE REMOVAL FROM SINTERING PROCESS GASES. (Vliyanie sostava izvestnyakovoy suspenzii na effektivnost ochistki aglomeratsionnykh gazov ot sermistogo angidrida). Text in Russian. Khim. Prom. (Moscow), no. 11:845-850, 1973. 10 refs.

The effect of the composition and of the nature of a finely dispersed limestone suspension on the efficiency of sulfur dioxide removal from sintering process gases by means of scrubbers was studied. The rate of SO₂ absorption was strongly influenced by the pH value of the suspension, which again was dependent on the calcium chloride and sodium chloride concentrations. A sharp decrease in the scrubber efficiency with a reduction of the suspension pH value, and rapid decrease in both the rate of SO₂ absorption and the pH value due to increased gas flow rate, were observed. The rate of absorption was highest at pH values around 6.0. The increase in the utilization coefficient of the limestone suspension was accompanied by reduction of the pH due to the reduced calcium carbonate concentration in the suspension. Powdered limestone was best for the absorption of SO₂. The chemical reactions involved and the rates of absorption varied according to the type of the limestone used. It is possible to obtain calcium sulfate or calcium sulfite by the use of adequate types of limestone.

37908

APTIC NO. 61391

Kuehl, Paul B.

EXHAUST GAS RECIRCULATION CONTROL VALVE. (General Motors Corp., Detroit, Mich.) U. S. Pat. 3,756,210. 4p., Sept. 4, 1973. 5 refs. (Appl. April 10, 1972, 3 claims).

An induction passage vacuum operated valve responsive to exhaust back pressure is described which controls recirculation of exhaust gases from the intake manifold exhaust crossover passage to the intake manifold induction passages. In other valve assemblies proposed for controlling exhaust gas recirculation in accordance with back pressure, the diaphragm or other member responsive to back pressure has directly operated the valve member which controls the flow of exhaust gases. In the design of such a valve assembly, certain limitations are encountered because the back pressure generally is very low. In the valve assembly of this invention, on the other hand, the exhaust gas flow controlling the valve member is not directly operated by the member responsive to exhaust back pressure; instead, the valve is positioned by a member operated by an induction passage vacuum signal, and the member responsive to exhaust back pressure controls that signal. Both the induction passage vacuum signal and the back pressure signal are routed entirely internally of the structural members, thus obviating the need for external hose connections. (Author abstract modified)

37909

APTIC NO. 61337

Kuntz, John B. and Anthony A. Spinola

METHOD OF QUENCHING SLAG. (U. S. Steel Corp.) U. S. Pat. 3,758,292. 2p., Sept. 11, 1973. 3 refs. (Appl. May 21, 1971, 5 claims).

A method of reducing hydrogen sulfide emission during the quenching of hot blast furnace slag is described. An alkali or alkaline earth metal, aluminum oxide, or carbonate is added to the water used to quench the molten blast furnace slag to reduce the H₂S emission. (Author abstract modified)

37910

APTIC NO. 61336

Lapple, Walter C. and Robert E. Matty

SO₂ ABSORPTION SYSTEM WITH REGENERATION OF ABSORBENT. (Babcock of Wilcox Co., New York) U. S. Pat. 3,758,668. 7p., Sept. 11, 1973. 10 refs. (Appl. Aug. 11, 1970, 11 claims).

A system for removing gaseous sulfur dioxide from the flue gases resulting from the combustion of carbon- and sulfur-containing fuel, where the absorbent liquid contains magnesium and the product liquid consists of magnesium sulfite crystals is described. The magnesium sulfite crystals are treated to reduce the water of hydration, and then are pelletized with carbon for subsequent thermal treatment to release reactive magnesium oxide particles reusable in the absorption system and a gaseous effluent containing SO₂. The gaseous SO₂ can then be converted to sulfuric acid or sulfur solids. Previous attempts to desulfurize flue gases have not been economically feasible. This new method is more efficient, and converts the sulfur into a usable form which can be sold to minimize economic loss while reducing air pollution. (Author abstract modified)

37911

APTIC NO. 61216

Lefebvre, S. and L. Scarniet Bolette

AMAZONE EXCHANGER, AN EFFICIENT DEVICE FOR POLLUTION ABATEMENT. (L. échangeur Amazone, un dispositif efficace dans la lutte antipollution). Text in French. Ann. Sci. Text. Belg., 21(4):351-374, Dec. 1973.

The concept and possible applications of the Amazone exchanger for mass and heat transfer between a gas phase and a liquid phase are described. The liquid phase is guided and supported by parallel textile cables which form a packing of high density (e.g., 15,000 cables per sq m of horizontal cross section area). The Amazone mass and heat exchanger excels by high gas- and liquid-specific flow rates (4 m/sec and 60 cu m/hr/sq m, respectively), low pressure drop, no soiling even with dirty liquid, and high transfer coefficient. The heat and mass exchanger can be used for air conditioning, water cooling, water oxygenation, and gas scrubbing, especially for the removal of hydrogen sulfur, sulfur dioxide, nitrogen oxides, hydrochloric acid, sulfuric acid, hydrofluoric acid, carbon monoxide, aldehydes, hydrocarbons, solvents, dusts, and aerosols from waste gases.

37912

APTIC NO. 60385

Levai, A.

AIR POLLUTION CAUSED BY ENERGY BEARERS, WAYS AND MEANS OF PREVENTION. (Luftverschmutzung durch Energieträger, Mittel und Wege der Abhilfe). Text in German. Acta Tech. Acad. Sci. Hung., 75(1-4):277-290, 1973. 24 refs.

Estimates are determined for the quantity of matter that will be polluting the air after the year 2000 and its expected spatial distribution based on world energy requirements and fuel composition, taking 1970 consumption data as a base. Global concentration data obtained are contrasted to emission standards valid at present; and regional and local pollutants such as carbon dioxide, carbon monoxide, sulfur dioxide, nitrogen oxides, particulates, and radioactive species (krypton, iodine, and triti-

AIR POLLUTION ABSTRACTS, AUGUST 1974

um) are examined. Possible methods dealt with for reducing pollution include: more favorable energy structuring, elimination of sulfur from smoke gases and fuels, remote heating the wider use of atomic energy, new designs in transportation, and possible official actions. The economic effects of environmental pollution and its prevention are also reviewed.

37913

APTIC NO. 60972

Lukas, Wolfgang and Lothar Zimmermann

TECHNOLOGICAL PROBLEMS OF ENVIRONMENTAL PROTECTION AS EXEMPLIFIED BY THE USE OF MILLING AIDS IN THE CEMENT INDUSTRY. (Verfahrenstechnische Probleme des Umweltschutzes am Beispiel des Mahlhilfsmittelensatzes in der Bindemittelindustrie). Text in German. Silikattech., 24(11):378-379, 1973. 5 refs.

A technological solution to the problem of increased dust emission from the electrostatic precipitator subsequent to the addition of a milling aid at a rate of 15 l/hr in a cement mill is presented. The considerable increase in the dust emission in the purified air was due to flashover in the electrostatic precipitator which prompted reduction of the input current, and more specifically to increased temperature and shift in the temperature-dew point relations. Normal operation of the electrostatic precipitator, and a normal temperature-dew point relation was restored by the increase of the water spray expenditure or by decrease of the gas throughput. The dust emission in the purified air was kept below 150 mg/cu m by these measures.

37914

APTIC NO. 55039

MacDonald, Bryce I.

AN OPERATOR'S VIEW OF SCRUBBER COLLECTORS. Air Pollution Control Assoc., Pittsburgh, Pa., Proc. Spec. Conf. Des. Oper. Maint. High Effic. Contr. Equip., St. Louis, Mo., 1973, p. 19-24. (March 29-30.)

The effectiveness of scrubber collection is discussed from an operator's point of view. Adequate field testing is required to determine if units will function efficiently. If the normal and maximum anticipated dust loadings, including particulate size distribution, are known, then a scrubber collector can be designed to the job. Capability to handle wide fluctuations in gas flow rate is somewhat more limited. Another variable is the possibility of variations in chemical composition of the particulate to be removed. It is misleading to think only in terms of the steady state condition. The operator must think of possible process malfunctions upstream which might result in a significant change in the chemical composition of the particulate being discharged, with a sharp eye open for subtle changes that can cause corrosion problems. Costs are the sum of capital costs and operating expense, and operating expense is closely related to the operability and maintenance problems. The evolution of three generations of particulate scrubbers used upstream of sulfuric acid plants in copper smelters operated by Kennecott Copper Corp. are described to illustrate the selection and operation of scrubber equipment.

37915

APTIC NO. 60357

Machi, Suet

UTILIZATION OF RADIOACTIVE RAYS ON ENVIRONMENTAL PROTECTION. (Kankyo hozon e no hoshasen riyō). Text in Japanese. Kagaku Keizai (Chemical Ind. Econ.), 20(11):1-6, Oct. 1973.

Radioactive radiation can be used for environmental protection in a number of ways. These include changing pollutants into harmless substances by promoting decomposition, oxidation, and polymerization reactions, replacement of catalysts in reactions where the decomposition products of catalysts are harmful pollutants, and use of radioactive radiation in the manufacture of pollutant removers such as ozone, polymeric coagulants, and ion-exchange membranes. The Ebara Manufacturing

Company has developed equipment for treatment of exhaust gases that removed 90% of the sulfur dioxide and all of the nitrogen oxides from a gas containing 1000 ppm SO₂ and 80-150 ppm NO_x by irradiation with electron rays at a rate of 10 cu m/hr.

37916

APTIC NO. 61232

Maeda, Yukiyooshi

ESTABLISHMENT OF NITROGEN OXIDES CONTROL TECHNIQUES RESEARCH AND DEVELOPMENT SYSTEM. (Chissosankabutsu taisaku gijutsu kenkyu haihatsu seido no sosetsu). Text in Japanese. Tsudansho Koho (Gaz. Minist. Int. Trade Ind.), no. 7208:23-26, Nov. 23, 1973.

In view of the urgent need for development of effective control techniques for nitrogen oxides causing photochemical oxidants, the Japanese Ministry of International Trade and Industry, has recently set up a new subsidy system designed to provide financial assistance to those engaged in the development of such techniques. This subsidy system, the need for development of NO_x control techniques, problems involving development of NO_x control techniques, and in outline of the research program to be launched from 1974 under the subsidy system are discussed. The major problems that have to be solved for development of an effective NO_x control system include: the insolubility in water and alkali of nitric oxide which constitutes 90% or more of NO_x; the development of a long-life and highly active catalyst, a high-performance oxidation agent, a low-cost, high-performance reducing agent, a low-cost and stable absorbent, and an effective disposal process; the safety factor of a denitrization plant; and the disposal of secondary pollutants formed as a result of the primary disposal treatment. The research to be taken up beginning in 1974 include: the catalytic contact reduction system; a combination of catalytic contact oxidation with chemical treatment process; an absorption process using a reducing agent; an absorption process using a solid absorbent; and an absorption process using a liquid absorbent.

37917

APTIC NO. 61287

Maki, Katsumi, Akira Kamisaka, Ryohei Enoki, and Yoshiharu Nishimura

REMOVAL OF HYDROGEN SULFIDE FROM COKE OVEN GAS AND RECOVERY OF ALKALI. (Kokusuro gasu no datsuryu to arukari no kaishu ni tsuite). Text in Japanese. Aromatikku (Aromatics), 25(11, 12):470-472, Nov./Dec. 1973.

A 25,000 N cu m/hr desulfurization plant at the Kawasaki Steel Corp. has had a problem due to the formation of salts in the absorption liquid. These are produced by a side reaction of hydrocyanic acid contained in a very small quantity in the coke oven gas. A reduction-pyrolysis process was developed to recover the alkali. This reduced the concentration of sodium thiocyanate and prevented the accumulation of salts. Alkali can be recovered from the liquid and can be recirculated to the absorption liquid tank of the desulfurization facility. The absorption alkali liquid is sprayed into the coke oven gas to remove hydrogen sulfide.

37918

APTIC NO. 61393

Mandelin, Dorothy J.

PROCESS FOR REMOVING SULFUR DIOXIDE FROM GAS STREAMS USING MOLTEN THIOCYANATES. (Occidental Petroleum Corp., Los Angeles, Calif.) U. S. Pat. 3,773,893. 6p., Nov. 20, 1973. 3 refs. (Appl. Feb. 24, 1970, 17 claims).

Molten inorganic thiocyanates, preferably potassium thiocyanates and mixtures of potassium and sodium thiocyanates, can be used as a scrubbing solvent to remove sulfur dioxide from stack gases at stack gas temperatures. Inclusion of reactive solutes in the molten thiocyanate system to convert the

absorbed SO₂ to other sulfur derivatives materially increases the capacity of the thiocyanate for the SO₂. Other SO₂ absorbents such as ethanolamines are functional only at relatively low temperatures, and therefore require a cooling system. This improved method eliminates the need for a cooling system. (Author abstract modified)

37919

APTIC NO. 61191

Masuda, Senichi

POLYPHASE ALTERNATING CURRENT TYPE ELECTROSTATIC PRECIPITATOR. (Taso koryushiki denki shujin sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-15184. 6p., May 12, 1973. (Appl. Nov. 14, 1968, 1 claim).

An invention designed to overcome the difficulties in dust collection of particles the specific resistance of which is too high or too low is described. It consists of an electrostatic precipitator that makes use of the principle of the electric field curtain. The dusty gas is led through a system of blocking electrodes in such a way that the particulates are removed without contacting the electrodes, which solves the abovementioned difficulties.

37920

APTIC NO. 61190

Matsumoto, Tokuchi

PROTECTOR CONTROL CIRCUIT FOR EXHAUST GAS CLEANER. (Haiki gasu jokasochi yo hogoki no seigyokai). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 48-15802. 2p., May 17, 1973. (Appl. July 14, 1969, 1 claim).

An innovation in the control circuitry of the protection device for exhaust gas cleaners of internal combustion engines is described. The new control circuit uses a direct current amplifier circuit without the amplifier element to directly detect the temperature of the cleaner, exhaust gas, or cooling water, thereby providing stably control of the protector device. The main circuit consists of a resistor that divides the power source voltage, a temperature sensor connected to this resistor, and a diode that controls to constant voltage the circuit formed between the sensor and the resistor. Combined with the Schmitt circuit and a relay circuit, it functions as a stable control circuit of the protector device.

37921

APTIC NO. 60801

McCarthy, James A. and James F. Durham

OPERATION AND PERFORMANCE OF THE LIME SCRUBBING SYSTEM AT MITSUI ALUMINUM COMPANY, LTD. Office of Air Quality Planning and Standards, Research Triangle Park, N. C., Emission Standards and Engineering Div., Rept. Environmental Protection Agency-450/2-73-007, 63p., Dec. 1973. 2 refs. (Presented at the National Enforcement Hearings, Washington, D. C., Nov. 1973.)

NTIS: PB 229633/AS

Design, operation, and performance details are reported for the Mitsui Aluminum Company's sulfur dioxide scrubber at Omuta, Japan. The scrubbing system is of the lime-type and is designed with 50% spare gas-handling capacity. Two independent and identical fixed-throat venturi scrubber modules are installed in parallel, and each is designed to handle 75% of the total boiler flue gases at full load. Multistage gas-slurry contacting is incorporated into the scrubber design for high efficiency SO₂ removal, and each scrubbing module contains two stages of gas and slurry contacting. Scale formation and buildup of solids on scrubber internals are reduced by several design features, including keeping the sides of the scrubber throats wet. Sulfur dioxide removal efficiencies have been maintained at 86-93% from initial start-up in March 1972 to July 1973, and no scrubber malfunction has occurred. Control of pH adequate to prevent scale formation and to achieve efficient SO₂ removal has been maintained during significant load

changes by manually adjusting the rate of addition of fresh carbide sludge to the scrubber system. Inspection of the system during shutdown has revealed no significant deposits or deterioration.

37922

APTIC NO. 61274

McGahey, Dean C. and Eugene W. Vest

GASOLINE VAPOR RECOVERY SYSTEM. (Texaco, Inc., New York) U. S. Pat. 3,756,291. 5p., Sept. 4, 1973. 2 refs. (Appl. Oct. 27, 1971, 8 claims).

An apparatus for preventing pollution of the atmosphere by gasoline fumes is described. The apparatus operates in conjunction with a gasoline dispensing pump which connects to the fuel tank of a vehicle. Fumes from the fuel tank are conducted and introduced to the flow of liquid gasoline as the gasoline is withdrawn from the storage truck or tank. (Author abstract modified)

37923

APTIC NO. 61366

McKie, Robert T.

COLLECTION OF SULFUR VALUES FROM FLUE GASES GENERATED BY METALLIC SULFIDE SMELTING AND CONVERTING. (Copper Range Co., New York) U. S. Pat. 3,775,094. 4p., Nov. 27, 1973. 9 refs. (Appl. March 19, 1971, 1 claim).

In the processing of nonferrous sulfide ores, the resulting flue gas, which contains sulfur dioxide, is passed through an aqueous scrubber containing calcium sulfate or calcium sulfite. The resulting SO₂ collection is several times greater than in the case of prior scrubbing techniques. This system also has application in scrubbing flue gas from sulfur bearing fuel. (Author abstract)

37924

APTIC NO. 60634

Miczek, Gerhard

WET SCRUBBER FOR DUSTY GASES. (Nassentstauber fuer Gase). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,228,000. 4p., Nov. 8, 1973. 1 ref. (3 claims).

A scrubber for dust separation from gases is described. The scrubber is composed of a circular cross-section, upright centrifuge chamber, wetted with liquid, a tangential gas inlet, gas outlet, and liquid inlets to the centrifuge chamber or to the gas inlet. Conventional baffles standing out horizontally from the chamber wall are arranged near the gas inlet. Preferably, the baffles at and after the gas inlet are partially interrupted circumferentially, and are set one above the other.

37925

APTIC NO. 61369

Miki, Masamitsu

SMOKELESS CASTING METHOD OF METAL. (Kinzoku no muen chuzoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-43244. 3p., Dec. 18, 1973. (Appl. April 9, 1970, 1 claim).

A sand-mold metal casting method is presented whereby a dead head sleeve designed to exterminate smoke usually generated when pouring molten metal into a mold is utilized. A disc-like lid made of a combustible material such as cardboard or plywood is placed on the sleeve. Mold sand is placed on the lid and a vent is provided along the vertical center line of the layer. As molten metal is poured into the mold through its pouring port, the molten metal fills up the mold and then rises into the through hole of the neckdown core and the sleeve or hot top section. The exothermic sleeve is thus fired and gives violent combustion of the materials of which it is made. The lid burns down, resulting in communication of the vent directly with the hot top section. Air in the mold and the hot top section is thus let out through the vent. After this the vent is closed with sand. The smoke (consisting of soot and other particulates) is then filtered and adsorbed by the sand layer as it moves through the layer.

AIR POLLUTION ABSTRACTS, AUGUST 1974

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APTIC NO. 61153

Miyazaki, Kazuo, Jun Hasegawa, Tetsunori Yamamoto, and Toshihiro Takakura

TREATMENT METHOD OF SULFUROUS ACID GAS CONTAINED IN EXHAUST GAS, USING WATER SOLUTION OF AMMONIUM SULFITE. (Aryusan ammonium suiyoeki ni yoru haigasuchu no arysungasu shoriho). Text in Japanese. (Showa Denko K.K., Tokyo (Japan)) Japan. Pat. Sho 48-43416. 4p., Dec. 18, 1973. (Appl. Nov. 17, 1970, 1 claim).

A method of desulfurization of exhaust gases by absorption with ammonium sulfite that uses a lower concentration of ammonium sulfite and a lower pH of treatment than the standard method is described. The concentration of sulfite used is 5 gram ions/l or lower, the pH from 4-10, and the gas/liquid contact flow speed 10 m/sec or higher. Compared to the conventional method this method gives a great reduction in white smoke emission.

37927

APTIC NO. 61358

Moran, Kevin E.

STACK GAS SCRUBBER. (Assignee not given.) U. S. Pat. 3,772,856. 4p., Nov. 20, 1973. 3 refs. (Appl. March 24, 1972, 9 claims).

A cyclone scrubber mounted on top of the stack is described for reducing air pollution from a cupola or other stack which emits particulate matter. The scrubber includes a ring of circumferentially spaced hollow vanes, each having a leading inner edge and a trailing outer edge. The tops of the vanes and the top of the space encircled by them are covered by a cap that projects outwardly beyond the vanes. A baffle wall encircling the vanes extends downwardly below them from the outer edge of the cap. Spaced below this wall is a bottom wall that extends outwardly beyond the baffle wall to a side wall that extends upwardly. The inner edge of each of the vanes is provided with a pair of nozzles directed laterally in opposite directions for delivering air under pressure laterally into the slots between the vanes and directing it outwardly through the slots. All of the vanes are inclined laterally in the same direction to cause the air issuing from the slots to flow around the inner surface of the baffle wall. Water is sprayed into the slots between the vanes to mix with the air in those slots. Dirt-laden water is separated from the cupola gases by the cyclone action of the scrubber. This invention is relatively inexpensive, efficient, and easy to maintain. (Author abstract modified)

37928

APTIC NO. 61527

Morishima, Naomasa

WET TYPE DUST COLLECTORS AND GAS ABSORPTION. (Shisshiki shujin sochi to gasu kyushu). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 2(11):803-813, Nov. 1973. 12 refs.

Fundamental theories of dust collection and gas absorption in the wet type dust collector are discussed. The values of partial dust collection rates for five kinds of dust collectors and the application of them to gas absorption are described. The distinguishing characteristic of wet dust collector is its dependence upon the ease of wetting the dust. The kinds of wet dust collectors include the washing tower, circling room, jet scrubber, mechanized scrubber, and venturi scrubber. The washing tower includes the packed tower and the spray tower, and the collection limit particle size is about 1.1 to 1.3 micron (particles of less than 0.5 micron are not almost collected). As for the circling room type, because the contact area between gas and liquid is small and the contact time is comparatively short, a good absorption effect can not be expected. In the case of the jet scrubber, because the liquid to gas ratio is great, it is considerably effective for gas absorption. The limit particle size is about 0.8 micron. Because pressure loss is small, a serial arrangement of scrubbers is possible, making gas absorption excellent. The venturi scrubber was formerly limited because of its great pressure drop, but recently has

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become popular where the collection of fine particles is strongly required, despite its high operating cost.

37929

APTIC NO. 60921

Muzio, L. J. and R. P. Wilson, Jr.

EXPERIMENTAL COMBUSTOR FOR DEVELOPMENT OF PACKAGE BOILER EMISSION CONTROL TECHNIQUES-PHASE I OF III. Ultrasystems, Inc., Irvine, Calif., Environmental and Applied Science Div. Environmental Protection Agency Contract 68-02-0222, Program Element 1A2014, Rept. EPA-R2-73-292a, 52p., July 1973. 15 refs.

NTIS: PB 224-274/AS

A unique 3.7 times 10 to the 6th power Btu/hr oil combustion facility was designed and built to develop nitrogen oxides control techniques for small boilers. The facility duplicates the key aspects of the oil flames of representative boilers in the 10 to the 6th power-10 to the 8th power Btu/hr range, and is capable of recycling and injecting any given amount of flue gas or air at unconventional sites on the combustor boundary. The facility is also fully instrumented to measure all flows (air, fuel, flue gas), temperatures along the combustor, and NOx, carbon monoxide, oxygen, and smoke emissions. Preliminary tests indicate that emissions from the test combustor (approximately 300 ppm of nitric oxide or 4.4 gm NO/Kg fuel), while operating on No. 6 oil, are consistent with emissions from field tested package boilers operating on No. 6 oil. (Author abstract modified)

37930

APTIC NO. 60353

Nakao, Ryuichi and Masayuki Yamada

ANTI-POLLUTION SYSTEM: MAZDA REAPS 2. (Kogai taisaku shisutemu, MAZDA REAPS 2). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 27(11):1270-1276, Nov. 1973.

The Mazda REAPS 2 is the new version of the MAZDA Rotary Engine Anti-Pollution System and consists of a combination of a thermal reactor with the MAZDA rotary engine. The rotary engine emits less nitrogen oxides than a standard engine and therefore permits the thermal reactor design to emphasize reduction of carbon monoxide and hydrocarbons. Engine performance and driveability are only slightly affected by the control system, the high exhaust gas temperature fits in well with the reaction in the thermal reactor, no problems are caused by leaded gasoline, and there is no valve recession even with unleaded gasoline. The anti-pollution system consists of a thermal reactor, an air injection exhaust gas recombination device, a blowby gas reduction device, and a fuel evaporation suppression device. According to the 10-mode Constant Volume Sampler test conducted by the Ministry of International Trade and Industry of this system (3 runs) CO emission was 1.1, 1.1, and 1.2 g/km, HC was 0.07, 0.11, and 0.06 g/km, and NOx was 0.45, 0.42, and 0.34 g/km.

37931

APTIC NO. 60919

Neumann, Gerhard Max

AIR-SUSPENSION FILTER WITH FILTER CELL CLAMP FOR TOXIC OR RADIOACTIVE DUSTS OR GASES. (Schwebstoffluftfilter-Gehaeuse mit Spannvorrichtung zur Aufnahme von Filterzellen zur Reinigung der Luft von toxischen oder radioaktiven Staebchen oder Gasen). Text in German. (Delbag-Luftfilter GmbH, Berlin (West Germany)) W. Ger. Pat. Appl. 2,215,193. 10p., Oct. 4, 1973. (6 claims).

A filter housing with an airtight clamping device to fasten filter cells for the separation of toxic or radioactive dusts or gases is described. The filter cell is pressed against the pressure frame in the housing by means of a spindle that lies parallel to the pressure frame, and has threads of opposite pitch at its ends and can be rotated from outside.

37932

APTIC NO. 60808

Nichols, Richard A.

HYDROCARBON-VAPOR RECOVERY. Chem. Eng., 80(6):85-92, March 5, 1973. (Presented at the Petroleum Mechanical Engineering Conference, New Orleans, La., Sept. 17-21, 1972.)

A low-temperature, recirculating, absorption system which is capable of 90% hydrocarbon vapor recovery has been designed for recovering such vapors present in saturated vapor air mixtures at loading and storage installations of oil companies. The system consists primarily of an absorber, while the remaining components are used to condition the vapor and liquid entering the absorber, to improve absorber efficiency, reduce thermal losses, and/or improve system safety. A typical installation can handle 525 cfm of vapor. Incoming vent gases (of unknown composition) pass through a large saturator tank where they are saturated with fuel; the entrained liquid is allowed to settle out before passing to an air compressor. The gases are brought to a pressure of 45 psig and an approximate temperature of 300 F as they pass from the saturator to the vapor compressor; as they proceed to an aftercooler where the temperature is reduced to ambient, the gases are allowed to pass through a bubble bar into the absorber where they are cooled by passing through cold liquid (minus 10 F). Essentially hydrocarbon-free air is discharged through the top of the tank since the hydrocarbons are absorbed here by sprayed gasoline. Processing costs, recovery efficiencies, and capital cost considerations are detailed in tabular and graphical form.

37933

APTIC NO. 61172

Nitsche, Manfred

POSSIBILITIES OF ENERGY RECOVERY AND FLUE GAS CLEANING IN WASTE INCINERATOR PLANTS. (Moglichkeiten der Energieverwertung und der Rauchgasreinigung bei Abfallverbrennungsanlagen). Text in German. CZ-Chem.-Tech., 2(10):397-401, Oct. 1973. 11 refs.

Possible methods and equipment available for flue gas cooling and cleaning, and for waste heat recovery in waste incinerator plants are described. The hot flue gases from waste incinerators have to be cooled to 100-300 C before their cleaning by different processes. Cooling by admission of air is regarded as uneconomical. Cooling by the injection of water or steam, possibly with subsequent air cooling, is the best method. Flue gas cooling is also possible by means of water-cooled heat exchangers and steam boilers. However, steam or electricity generation should be of secondary importance in connection with waste incinerator plants. Flue gas cooling equipment should be designed with respect to such parameters as temperature, humidity, dust content, properties and composition of the flue gases, and the required efficiency. Mechanical dust separation is best for dust particles larger than 3 microns. Advantages and disadvantages of different types of flue gas cleaning equipment, such as of settling chambers cyclones, tissue filters, electrostatic precipitators, spray towers, venturi separators, and column scrubbers are described. Filters, electrostatic precipitators, and condensation separators give high efficiency with relatively low energy consumption.

37934

APTIC NO. 60857

Noel, Thomas M.

PARTICULATE CONTROL IN THE TEXTILE DYEING AND FINISHING INDUSTRY. Rhode Island Dept. of Health 6p., 1973.

Method for control of particulate emissions from the textile dyeing and finishing industry are reviewed. The possibility of a process change to reduce the amount of residual organics in the cloth should be considered before exploring emission control systems for a given problem. Additional or more effective scouring at some stage prior to high-temperature heating is the easiest and least expensive method. Dry cleaning can remove

residual organics which cause submicron smoke upon heating. Three basic approaches to exhaust emission control that have representative equipment installed in dyeing and finishing mills are: incineration, scrubbing, and electrostatic precipitation. Incineration is highly effective on any organic emission, and complete oxidation is obtained at 1300-1500 F at a residence time of 0.5 sec approximately. Chlorinated hydrocarbons, however, can reduce the incinerator's effectiveness. High-scrubbers with at least 60 in. (water) pressure drop can also be used to comply with a 20% opacity limit, although their operating cost is relatively high. Electrostatic precipitators can also sufficiently collect submicron smoke to comply with the opacity limit; but, to operate properly, the collection surfaces must be kept reasonably clean. A prescrubber for solid particulates may sometimes be required ahead of the precipitator to avoid caking of the surfaces. Operating cost of an electrostatic unit is relatively low. Several case histories of recently installed control equipment are presented.

37935

APTIC NO. 61456

Nohira, Hidetaka and Hiroaki Nishimura

RECIRCULATION TYPE EXHAUST GAS CLEANING SYSTEM. (Nippondenso Co., Ltd., Kariya-shi (Japan) and Toyota Jidosha Kogyo Kabushiki Kaisha, Toyotacho (Japan)) U. S. Pat. 3,774,399, 4p., Nov. 27, 1973. 4 refs. (Appl. Aug. 22, 1972, 5 claims).

A recirculation-type exhaust gas cleaning system is described. It consists of a turbine driven by the output air of an air pump and adapted to drive a blower for directing a part of the exhaust gas into an air cleaner or a carburetor provided in an engine intake system, whereby the maximum temperature in the engine cylinder is reduced. Therefore, the nitrogen oxide content in the exhaust gas can be decreased. In conventional recirculation-type cleaners, the cooler through which the exhaust gas is passed often is clogged by powders of copper and carbon in the exhaust gas or corroded by water or sulfuric acid contained in the exhaust gas. A filter is usually needed to remove the powders, water, and sulfuric acid, and this adversely increases the flow resistance in the cleaning system. It is necessary to feed the recirculation flow of the exhaust gas under pressure in order to overcome the flow resistance of the filter, and if a motor-driven blower is used for this purpose, a high-speed motor of about 40,000 r.p.m. must be used for attaining a necessary pressure rise. Therefore, the system requires an increased cost. The present invention eliminates these disadvantages by providing the turbine for driving the blower. The blower can be driven at a high speed to recirculate a portion of exhaust gas from the exhaust pipe into the air intake of the engine. Foreign particles, water, and sulfuric acid are removed by a filter so corrosion or clogging can be eliminated. The cost to the system can be reduced by using the turbine-driven blower. (Author abstract modified)

37936

APTIC NO. 61343

Ohuchi, H., K. Sano, Y. Horio, H. Aoyama, A. Ohi, and S. Nakamura

EFFECTS OF PREPARING METHOD OF PT-PD CATALYST ON OXIDATION ACTIVITY AND MECHANICAL ATTRITION. (Jidosha haishutsu gasu joka shokubai no chosai to sono kassei oyobi mason). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 8(6):19-30, Nov. 1973. 5 refs.

The effects of the preparing method of a platinum-palladium catalyst used in automobile emission controls upon the oxidation activity and the mechanical attrition were investigated. The catalysts were prepared by impregnating the preformed spherical alumina pellets with aqueous solutions of chloroplatinic acid and palladium chloride. The results of the activity tests and the attrition tests indicate that the catalyst calcinated in the atmosphere of water vapor and nitrogen gas mixture showed a higher oxidation activity than the catalysts calcinated in the air. The catalysts calcinated in water-nitrogen

atmosphere at 1000 C gave more attrition losses than those calcinated at 800 C. The difference of these properties in the two alumina supports used can be attributable to the difference in distribution of Pd in the pellets and it resulted in the difference in the activity and the attrition properties of the catalysts.

37937

APTIC NO. 61425

Okamura, Katsuro

BAG FILTER SYSTEM FOR THE DUST CONTAINING HEAVY METALS. (Jukinzoku ganyu funjin to rokashiki shujin no mondaiten). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(11):1145-1148, Nov. 1973.

At the cadmium pigment-manufacturing factory, there are three kinds of dusts, pigment dust alone, pigment dust plus sulfur dioxide, and pigment dust plus sulfur dioxide plus water vapor. Since the amount of water vapor is negligible, only the first two should be considered from the standpoint of actual conditions. In the case of the pigment dust alone, the specific gravity of dust ranges from 4.3 to 4.6 and the particle size of dust is comparatively small (mostly less than 30 micron). The dust concentration is about 0.2 to 2.0 g/cu m, and accordingly, if the emission standard for cadmium is 1 mg/cu m, the required dust collection rate is a maximum of 99.93%. To attain such a high efficiency of dust collection, the following measures must be taken: prefilters should be provided to keep the dust concentration at the inlet to less than 0.1 g/cu m (high efficiency multi-cyclones are recommended), filters for high concentration dust sources should be provided, the suction hood should be the enclosed type to avoid the suction of excessive air, the rate of filtration should be less than 1 cm/sec, and as the method of dropping dust a combination of a counter pressure system and a mechanical vibration system should be used.

37938

APTIC NO. 56928

Okuda, H.

SUCCESSFUL EXAMPLES OF INDUSTRIAL POLLUTION PROTECTION (5). (Sangyo kogai boshi seiko rei (5)). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Ind.), 47(10):419-421, Oct. 1973.

Two plants are described as examples of successful pollution control. A sulfur dioxide recovery plant reacts its exhaust SO₂ gas with caustic soda to give sodium sulfite. From the stack gas of the sulfuric acid manufacturing plant which contains 4000 ppm SO₂ in 150 cu m/min, 18-20% of the sodium sulfite is recovered and the exit SO₂ gas is reduced to below 50 ppm. Construction cost was approximately \$60,000.00. A chlorine gas leakage protection facility treats 1000 kg/hr for 80 cu/m exhaust gas, giving below 5 ppm concentration at the exit. It consists of a scrubber, a fan, a neutralization pump, a recirculation fan, chlorine detectors, and accessories. Construction cost was approximately \$30,000.00. Exit gas concentration was 0.1 ppm for 5200-8500 ppm emission gas. Removal ratio was more than 99.99%.

37939

APTIC NO. 61424

Okuyama, Kikuo

THE CHARACTERISTICS AND APPLICATION OF MIST SEPARATORS. (Mist separator no seino to sono oyo). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 2(11):824-830, Nov. 1973. 17 refs.

Mist separators are classified into 4 groups according to the structure of the packing material. These are packed towers, packed layers, flat plates, and zig-zag bent plates. Mist particles are collected in these separators by collision with the collector materials, diffusion of mist particles by the Brownian motion, interruption, precipitation by gravity, electrostatic force, and thermal migration. These mechanisms are the same as in the case of collection of solid dust particles. However, the collected mist particles behave in a way different from

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dust particles. Namely, the liquid particles flow along the surface of the collector as soon as they are collected. The collector thus becomes wet. After a long time of collection the liquid layer becomes so thick that it is blown off from the collector forming a mist again. Therefore, the prevention of reforming of the mist is important. The theory of collection of mist particles by a filter made of fibers is presented. Estimation of the collection efficiency of various mist separators is discussed.

37940

APTIC NO. 61381

Osaka, T., A. Asano, R. Ishida, K. Iwamoto, K. Takeuchi, A. Nakao, T. Koyama, and M. Matsumura

RELATION OF CONCENTRATIONS OF SUSPENDED PARTICULATES BETWEEN IN BUILDINGS AND OUTSIDE ATMOSPHERE. (Birunai fuyu funjin nodo to gaiki fuyu funjin nodo to no kankei). Text in Japanese. Tokyo-to Eisei Kyoku Gakkai-shi (Rept. Tokyo Public Health Studies), no. 52:44-45, Oct. 1973.

Four different building air filters have been compared for performance; an auto role filter (glass wool), an auto role wet type filter (glass wool wet by oil), a unit type (glass wool) plus washer, and an electrostatic precipitator. Measurements were made from December 1972 to June 1973 with a Roken filter. O.D. values of the building using the auto role filter are higher than those of the outside atmosphere. Apparently this type of filter is not effective. O.D. values for the other three types of filters were lower than those of the outside atmosphere.

37941

APTIC NO. 60751

Oswald, William J., Ronald A. Tsugita, Clarence G. Golueke, and Robert C. Cooper

ANAEROBIC-AEROBIC PONDS FOR BEET SUGAR WASTE TREATMENT. Beet Sugar Development Foundation, Fort Collins, Colo., Environmental Protection Agency Grants WPD 93-03 and 93-04. EPA-R2-73-025, 162p., Feb. 1973. 13 refs.

Physical, chemical, and mechanical data were collected for pilot-sized anaerobic, facultative, and aerobic ponds used to treat sugarbeet factory transport (flume) water wastes. Odor problems associated with the beet waste ponds were solved by avoiding overloading of ponds, providing sufficient treatment area, providing sufficient aeration, and by nutrient supplementation. The maximum anaerobic pond loading was determined at 1000 lbs/acre/day; that for secondary aerobic ponds was 200 lbs/acre/day for the proper prevention of odors. Performance data collected for the facultative phase of treating showed cause for abandoning that phase. The composition of gas produced from the anaerobic pond was superficially determined by a simple ignition test to contain a substantial combustible fraction.

37942

APTIC NO. 60926

Pausch, Josef

DEVICE FOR THE REMOVAL OF DUST SETTLED ON THE OUTSIDE OF TUBULAR FILTER ELEMENTS OF DUST SEPARATORS. (Vorrichtung zum Entfernen von Staub, der sich auf der Aussenflaeche rohrfoermiger Filterelemente einer Staubabscheidungseinrichtung abgesetzt hat). Text in German. (Assignee not given.) W. Ger. Pat. 1,761,926. 3p., Nov. 15, 1973. 1 ref. (Appl. July 23, 1968, 1 claim).

A tubular filter element of dust separators with an improved procedure for the removal of dust settled on the outside of the filter element is described. The dust-laden gas to be cleaned is admitted into a primary chamber through an injector and it is sent into the upright tubular filter element. The lower end of the tubular filter element is closed. At the inlet zone, the inside of the tubular filter element communicates with the first chamber to provide gas flow in either direction. For dedusting the outside of the filter element, a high-pressure gas is admitted through the injector and the inlet part into the filter ele-

ment, and additional gas is sucked in through the openings in the inlet plate whereby the pressure inside the filter element exceeds the outside pressure, and the high-pressure air penetrates through the wall of the filter element, removing the dust from its outside.

37943

Pietsch, Wolfgang

APTIC NO. 61149

MECHANICAL TECHNOLOGY IN THE SERVICE OF ENVIRONMENTAL PROTECTION. (Mechanische Verfahrenstechnik im Dienst der Umwelttechnik). Text in German. CZ-Chem. Tech., 2(9):351-355, Sept. 1973. 8 refs. (Presented at the First International Conference on the Compaction and Consolidation of Particulate Matter, Brighton, Great Britain, Oct. 3-5, 1972.)

The possible uses of agglomeration techniques for the increase of particle size in environmental protection areas are described. Agglomeration techniques can be used for the granulation of finely dispersed particles to prevent primary air pollution, as in the dressing of minerals and ores, in the production of fireproof materials (e.g., magnesia), and in fertilizer production; for the increase of dust separation efficiency, (e.g., of electrostatic precipitators and wet type dust separators), as well as for the prevention of secondary air pollution by finely dispersed materials and separated dusts, as in steel works, foundries, power plants, heat treatment and calcination processes, and in ore dressing. The safe disposal of many waste materials requires agglomeration.

37944

APTIC NO. 61392

Preusser, Gerhard and Martin Schulze

WASHING AGENT AND A PROCESS FOR WASHING ACIDIC COMPONENTS FROM A GAS STREAM. (Heinrich Koppers Gesellschaft, Essen (West Germany)) U. S. Pat. 3,773,896. 3p., Nov. 20, 1973. 3 refs. (Appl. April 26, 1971, 5 claims).

A washing agent for removing the acidic components from a gas stream is described. Previous chemically active washing agents required a large amount of thermal energy to break the bond between the agent and the acidic components to effect separation. The washing agent described, which includes a carboxylic acid amide of morpholine containing, preferably, between one and seven carbon atoms in the carboxylic acid chain, can be separated from the acidic components by distillation at about 80 C. The washing agent can absorb carbon dioxide, hydrocyanic acid, and especially hydrogen sulfide with great efficiency. Since the agent has a marked preference for the absorption of H₂S over other gaseous acidic components in the gas stream, it can be used to selectively remove H₂S from a gas containing several gaseous impurities. Because of this feature, and the fact that the washing agency can be easily regenerated for further use, this agent is improved over previous washing agents.

37945

APTIC NO. 61401

Richter, Gerhard

FOR ENVIRONMENTAL PROTECTION: PROGRESSIVE WORKSHOP EQUIPMENT. (Im Sinne des Umweltschutzes: Fortschrittliche Werkstatt-Einrichtungen). Text in German. Wasser Luft Betrieb, 17(12):431-433, 1973.

Environmental pollution gets more expensive, so that it pays to install efficient equipment for air cleaning. Progressive plants for use under the most varying operating conditions are now available. The electrostatic precipitator is one of them. With it, dust collection efficiencies of up to 99% can be achieved. The unit operates under temperatures of up to 500 C. It has little sensitivity to load changes no matter whether the dust quantity or the gas volume changes. With cloth filters, dust collection efficiencies of 99.7% can be achieved at grain sizes above 0.1 micron. Water-sprayed electroplated sheet

steel plates which can be set up anywhere in the workshop are also for fine dust collection. Several such plates can be combined. They are mostly used for separation of paint and dye mists.

37946

APTIC NO. 61371

Riegel, Herbert, Harvey D. Schindler, and Morgan C. Sze

TRANSCAT - A NEW PROCESS FOR CHLORINATED HYDROCARBON PRODUCTION PROVIDES GOOD ECONOMY AND POLLUTION CONTROL. (Transcat - eine neues wirtschaftliches und umweltfreundliches Verfahren zur Herstellung chlorierter Kohlenwasserstoffe). Text in German. Erdoel Kohle-Erdgas-Petrochem., 26(12):704-709, 1973. 6 refs.

Some unwanted products of the manufacture of chlorinated hydrocarbons cause pollution problems. The Transcat Process, developed by the Lummus Company, offers an economical way to convert such wastes into usable by-products. The process uses a unique reactor system with a continuously circulating inorganic salt melt. The salt melt fulfills several important process functions such as catalysis of chlorination, oxychlorination, and dehydrochlorination reactions, chemisorption and addition of oxygen, and chemisorption and addition of chlorine in the form of chlorinated hydrocarbon-containing waste gases or liquids. The system consists of two reactors; the oxidation reactor and the chlorination/oxychlorination reactor. Moreover, there is a reactor for burning chlorinated hydrocarbon-containing waste products for the recovery of chlorine. The chemical reactions and the operation of a Transcat reactor system for the production of ethylene trichloride from ethane, chlorine, and chlorinated hydrocarbon-containing waste gases and fluids are described in detail.

37947

APTIC NO. 61268

Roberts, Edward S. and Sidney B. Tuwiner

SO₂ RECOVERY AND CONVERSION TO ELEMENTAL SULFUR. (Treadwell Corp., New York) U. S. Pat. 3,773,900. 4p., Nov. 20, 1973. 4 refs. (Appl. Jan. 26, 1972, 4 claims).

A method for absorbing sulfur dioxide from combustion stack gases is described. The absorbent is an aqueous solution of ammonium sulfite and bisulfite, preferably with a molar concentration ratio of SO₂ to ammonia between 0.6 and 0.8. The aqueous solution is stripped in a column under positive pressure with a rising stream of water vapor and gas containing hydrogen sulfide or carbonyl sulfide which act as sulfiding gases. The column is operated at a temperature above the melting point of elemental sulfur, and the sulfiding gas is introduced at or near the bottom of the column, for example, above a reboiler. The molten elemental sulfur flows down the column as a liquid. The overhead from the column contains ammonia and water vapor substantially free of H₂S or SO₂. Similarly, the bottom of the column and the reboiler contain ammonium sulfate and other salts of ammonium but substantially no SO₂. The operation of this column obviates the use of an expensive organic solvent and its regeneration, as had been employed previously in similar methods. (Author abstract modified)

37948

APTIC NO. 61529

Rueb, Friedmund

DUST COLLECTION AND PRESERVATION OF CLEAN AIR IN THE RUBBER, ASBESTOS AND PLASTICS INDUSTRY. (Entstaubung und Reinhaltung der Luft in der Gummi-, Asbest- und Kunststoffindustrie). Text in German. Gummi, Asbest Kunstst., 26(12):1046-1054, 1973. 10 refs.

In the production and processing of rubber, asbestos, and plastics dusts and vapors develop in more or less large quantities. For avoidance of any air pollution they must be drawn off close to the point of origin. The dusts developing at these

processes have the most varying properties. Depending on the composition they may be toxic, inflammable and explosive. Some dusts are a valuable recovery product. For dust collection cyclones, cloth filters and wet collectors are in use. For inflammable and explosive dusts wet collectors are frequently preferred. Cloth filters are applied in those cases where the dust can be recovered or wherever high degrees of collection efficiency are required. A review of the various kinds of cyclones, cloth filters and wet collectors is given. Vapors are eliminated by thermal or catalytic afterburning. Which of the two processes is to be employed in the individual case depends primarily on the type and concentration of the pollutants. The principles underlying the two processes are reviewed.

37949

APTIC NO. 61180

Ruhl, Emil

DESTRUCTION OF LIQUID RESIDUES BY INCINERATION. (Vernichtung fluessiger Rueckstaende durch Verbrennung). Text in German. CZ-Chem.-Tech., 2(10):385-388, Oct. 1973.

Processes and equipment for the destruction of liquid residues by incineration and for the purification of the flue gases generated by the incineration process are described. Liquid wastes with low calorific value are atomized for incineration by the use of auxiliary firing, while wastes with calorific values exceeding 2000 to 3000 kcal/kg can be incinerated directly, possibly by the use of a pilot burner. A dwell time of 1 to 2 sec in the combustion chamber, an incineration temperature of 800-1000 C, and an air excess coefficient of 1-2% are required for incineration. The combustion air is subdivided into primary and secondary air. Combined incineration of solid and liquid wastes is possible in adequate equipment. Organic components are completely burned at a temperature of 830 C, but further increase of the temperature is essential for the oxidation of carbon monoxide. Nitrogen oxides formation, usually modest, can be reduced by lowering the combustion temperature after the oxidation of the organic components by the addition of secondary air. Acid flue gases can be neutralized by the addition of slaked lime or alkali solutions. Solid salt particles can be separated from the flue gases by spray drying, using a cyclone for the subsequent capture of fine salt particles. Very fine salt particles are separated by wetted tissue filters at efficiencies of 95-99%. The salt solution thus obtained is treated by spray drying for salt recovery. The incineration costs can be reduced by waste heat recovery.

37950

APTIC NO. 60980

Saintsbury, J. A., P. Sampath, and H. C. Eatock

SIMPLE AUTOMOBILE GAS TURBINE COMBUSTORS FOR LOW EMISSIONS. Preprint, Society of Automotive Engineers, New York, and Motor and Equipment Manufacturers Assoc., 16p., 1973. 12 refs. (Presented at the Society of Automotive Engineers and Motor and Equipment Manufacturers Association Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, Ill., June 18-22, 1973, Paper 730670.)

Combustors suitable for both simple and regenerative cycle automotive gas turbine engines were designed and a rig was developed for low exhaust emissions. The simple cycle combustor has demonstrated potential for meeting the Environmental Protection Agency 1976 automotive emissions standards, employing simple, practical hardware with no variable geometry. Low nitrogen oxides levels have been demonstrated in both the simple cycle and regenerative cycle combustors principally by using a lean, well-mixed primary zone with controlled downstream quench. Carbon monoxide levels were minimized principally by maintaining sufficiently high intermediate zone temperatures. Hydrocarbons, which are usually only a problem with the simple cycle combustors, can be controlled by reducing quenching effects of film cooling air, by maintaining adequate wall temperatures, and by careful atten-

tion to fuel atomization. Analytical modeling, water analogy for flow path studies, development at atmospheric pressure, and full pressure development can all be useful tools for developing low emission combustors. (Author conclusions modified)

37951

APTIC NO. 60923

Sakhuja, Ravinder K. and Andrew D. Vasilakis

LOW EMISSION COMBUSTOR DEVELOPMENT FOR AUTOMOTIVE RANKINE-CYCLE ENGINES. Preprint, Society of Automotive Engineers, Inc., New York, 12p., 1973. 8 refs. (Presented at the Society of Automotive Engineers Motor and Equipment Manufacturers Association, Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, Ill., June 18-22, 1973, Paper 730672.)

The development of two low emission combustors (axial and radial combustors) for an automotive Rankine (steam) cycle engine is described. Emphasis was placed on low emissions, fast response, compactness, and low parasitic power. Air atomization and rotary atomization of fuel were incorporated, leading to two different combustor configurations. Emission characteristics of hydrocarbons, carbon monoxide, and oxides of nitrogen are described for both concepts. The HC and CO emissions were generally well below 1976 Federal standards for automotive emissions (usually by a factor of 10). Nitrogen oxide emissions were lower than the standards by a factor of 1.5. Fine atomization of fuel and thorough air-fuel mixing were the keys to low NOx emissions. The use of exhaust gas recirculation reduced NOx emissions significantly. The effects of excess air and cooled primary zone were also studied. The Rankine systems also met high turndown ratio and low parasitic power requirements. The engine and test facility design are described. (Author abstract modified)

37952

APTIC NO. 61340

Scheitlin, George E.

CATALYTIC CONVERTER. (Arvin Industries, Inc., Columbus, Ind.) U. S. Pat. 3,771,969. 9p., Nov. 13, 1973. 13 refs. (Appl. May 10, 1971, 6 claims).

A catalytic converter for removing noxious pollutants from an exhaust gas stream is described. It has a pair of longitudinally spaced conversion chambers mounted between its inlet and outlet. Each of the chambers extends diametrically across the converter and each is provided with a pair of opposed faces having openings formed therein whereby the exhaust gases will pass successively through the chambers during their movement from the inlet to the outlet. Prior art converters had no provisions for the selective treatment and removal of oxidizable pollutants such as hydrocarbons and carbon monoxide and reducible pollutants such as nitrogen oxides. This invention overcomes the disadvantages of the prior converters by having a pair of conversion chambers adapted to hold two different catalysts so that the exhaust gases can be passed successively through the chambers under two different conditions of reactions. (Author abstract modified)

37953

APTIC NO. 60834

Schreter, Robert E.

CARBON MONOXIDE (CO) FORMATION BY AGGREGATE DRYERS. Preprint, 17p., July 21, 1973. 5 refs. (Presented at the National Asphalt Pavement Association, Annual Midyear Meeting, 17th, Portland, Oreg., 1973.)

Carbon monoxide formation by aggregate dryers in asphalt plants is discussed. The CO diminishes when excess air increases. Since the Los Angeles County emission standard for CO is 2000 ppm, methods of reducing CO from asphalt plants to this level were studied. Operation with deficient air, excess air, and at various temperatures were studied to determine why CO forms. The CO could be formed by quenching, and the quantity of CO formed could be affected by flame length,

position, and reaction rate. Two proposed methods of modification were tested for reducing CO formation: modifying the forward flights to reduce the chill load passing through the flame; and adding a premix air system to the burner to increase the reaction rate within the flame and to modify the flame size and shape. Initial tests of the unmodified dryer gave 5% CO (50,000 ppm) at high operating conditions. When the burner was readjusted along with other plant adjustments, CO formation was reduced to 0.6% (6000 ppm). With the premix air system, CO was 0.1% (100 ppm). Since modification of the combustion air, forward lighting in the dryer, and modification of the burner were sufficient to reduce CO to less than the emission standard, it was unnecessary to build an externally fired air heater to achieve complete combustion before entering the dryer.

37954

APTIC NO. 61271

Scott, David

METHOD OF COAGULATING AEROSOLS. (Chubb Industries Ltd., Ontario (Canada)) U. S. Pat. 3,771,286. 6p., Nov. 13, 1973. 9 refs. (Appl. Feb. 4, 1972, 14 claims).

A method of coagulating aerosols is disclosed which comprises setting up either planes or lines of particulate concentrations by means of one or more standing acoustic fields and then further concentrating and coagulating the particulate material by propagating a sawtooth wave along the lines or planes of particulate concentration. This method can be used to clean gases emitted from various sources and to collect valuable particulate material which would otherwise be lost to the atmosphere. Previous methods of agglomeration using sonic fields have been unsatisfactory for widespread application. This improved method is advantageous because of the special action of two or more separately identifiable acoustic fields, at least two of which have essentially different functions in the process of the acoustic agglomeration of aerosols. This method can be used on an industrial scale. (Author abstract modified)

37955

APTIC NO. 61338

Shah, Indravadan S.

REMOVAL OF SULFUR DIOXIDE FROM GAS STREAMS. (Chemical Construction Corp., New York) U. S. Pat. 3,775,532. 5p., Nov. 27, 1973. 3 refs. (Appl. Feb. 18, 1972, 10 claims).

Numerous procedures have been proposed or developed to remove sulfur dioxide from waste gases using aqueous alkaline solutions. In the present invention, the buildup of sodium sulfate concentration due to in situ oxidation of sulfite in circulating aqueous sodium sulfite to remove SO₂ is prevented effectively by a two-stage precipitation procedure. The SO₂ is removed by scrubbing with aqueous sodium sulfite, so that a portion of the sodium sulfite is converted to sodium bisulfite. A bleed stream is withdrawn from the circulating solution and reacted with calcium carbonate to produce precipitated solid calcium sulfite, which is filtered off. At least a portion of the solution is then reacted with calcium oxide to precipitate solid calcium sulfate and thereby to prevent a buildup of the sulfate in the system. The calcium sulfate is filtered from the remaining solution, which is returned to the gas scrubbing operation. (Author abstract modified)

37956

APTIC NO. 61197

Shimada, Hajime

PRESENT STATUS OF POLLUTION CONTROL IN THE SHIMURA KAKO DATE FACTORY. (Shimura Kato Date kojo ni okeru kogai boshi taisaku no genjo ni tsuite). Text in Japanese. Kogai Boshi Netsukanri Hokkaido (Hokkaido Assoc. Energy Pollut. Control, Japan), 26(85):22-24, March 1973.

Control measures at the Date ferro-nickel plant of Shimura Koko Co. are outlined. Sprinkler systems exist to control scattering of the ore dust. Dust and sulfur dioxide from the rotary

kiln are controlled by a tetracyclone and by introduction into the air mix of a caustic soda solution. Dust collected by the tetracyclone is pelletized. The heavy oil used was changed to heavy oil C which contains a lower amount of sulfur. The dust in the exhaust gas from two electric furnaces is removed by a bag filter, and sulfur dioxide is washed with caustic soda by a spray tower scrubber. The Reinschtahr desulfurization stirrer has been adopted. Sulfur dioxide from the convertor is removed using caustic soda as an absorbent.

37957

APTIC NO. 61192

Shimokawa, Hajime

DRYER FOR DOMESTIC ANIMAL EXCREMENT. (Kachiku haishutsubutsu no kanso sochi). Text in Japanese. (Satake Seisakusho Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-35578. 3p., Oct. 29, 1973. (Appl. May 10, 1968, 1 claim).

The design and operation of a rotary drum dryer for domestic animal excrement are described. The excrement is fed from a hopper into the drum by a screw drier. It is dried very effectively while being stirred by the continuous rotation of the drum and by short bladed projections from the inner wall of the drum. As the drying progresses the excrement is pulled by suction toward the discharge port. The drier it is, the more it is advanced toward the discharge port so that the drying is accomplished in a closed system.

37958

APTIC NO. 60737

Shoffstall, D. R. and D. H. Larson

AERODYNAMIC CONTROL OF NITROGEN OXIDES AND OTHER POLLUTANTS FROM FOSSIL FUEL COMBUSTION. VOLUME I. DATA ANALYSIS AND SUMMARY OF CONCLUSIONS. (FINAL REPORT). Inst. of Gas Technology, Chicago, Ill., Environmental Protection Agency Contract 68-02-0216, Program Element 1A2014, ROAP 21ADG47, EPA-650/2-73-033a, 80p., Oct. 1973.

The combustion in five types of industrial burners was studied and related to aerodynamics and pollution emission characteristics. The burners were a utility power boiler, a high-intensity or flat-flame, a movable vane, an axial flow, and a partial baffle burner. Nitric oxide was measured as a function of changes in combustion conditions such as percent excess oxygen, preheat temperatures of the combustion air, and firing rate of natural gas. Point-by-point in-the-flame tests were made to measure gas species concentrations, temperatures, and velocities (magnitude and direction), in an attempt to determine where and how the NO was being formed. Type II flames with radial gas injection as produced by the axial burner and the boiler with a radial gas nozzle had peak NO concentrations at an excess air level of 11% or less. Type I or Type II flames with axial injection, axial burner, swirl burner, or flat-flame burner with axial gas nozzles produced their maximum NO emissions at excess air levels greater than 22%. The NO increased with increased preheat temperature of combustion air; the magnitude of the incremental change was dependent on the type of burner and the method of gas injection. Changing from axial to radial gas injection consistently resulted in increased NO, which could be as large as 600 ppm. (Author summary modified)

37959

APTIC NO. 61525

Shoji, Yuji, Shunichiro Akiyama, Kyosuke Nagatoshi, Masaru Kiuchi, and Hiromitsu Hoshi

ON MATERIALS FOR AUTOMOTIVE EXHAUST GAS DISPOSAL DEVICES. (Jidosha haishutsugasu shorishochiyo zairyo ni tsuite). Text in Japanese. Nihon Sutenresu Giho (Nihon Stainless Tech. Rep.), no. 10:31-64, 1973. 40 refs.

Mechanical and chemical properties of materials that can be used to manufacture various automotive exhaust gas disposal

devices are discussed. A desirable material for a thermal reactor should be highly heat-resistant, withstanding not only the normal operating temperature range of 871-1038 C but also the occasional maximum temperature of 1260 C, should give long service life of 50,000-100,000 cycles and provide high corrosion and erosion resistance, and should have low manufacturing cost. The material requirements for an afterburner are practically the same as for a thermal reactor. Materials for an exhaust gas recirculation system and a muffler must also be highly heat resistant and acid resistant. The material for a catalytic converter need not be highly heat resistant since the operating temperature of the converter is around 800 C, but should provide higher workability and easier welding because its structure is rather complex. Properties of various stainless steels are reviewed as to their possible applications in the manufacture of automotive exhaust gas disposal devices.

37960

APTIC NO. 61272

Skoli, Sigmund, Harry G. Mojonner, Chester J. Witt, Walter A. Seyfarth, and Victor H. Ross

COLLECTION DEVICE FOR DRYER EXHAUST GASES. (Assignee not given.) U. S. Pat. 3,771,299. 9p., Nov. 13, 1973. 18 refs. (Appl. June 9, 1969, 4 claims).

A wet-process apparatus for removing suspended particles from dryer exhaust gases including a spray device delivering atomized liquid into the gas stream and a vessel with cooled or wetted surfaces for collecting liquid from the gases together with the particles trapped by the liquid is described. This invention can be used to separate finely divided particles from a gas stream such as the exhaust from a milk dryer. Conventional cyclones and bag filters used previously were not as efficient and economical. The apparatus can be put through a clean-up and sanitizing cycle which makes it advantageous in the manufacture of powdered milk products. (Author abstract modified)

37961

APTIC NO. 60978

Sommer, Wilfried

THE ELECTRIC COMPANIES AND ENVIRONMENTAL PROTECTION. (EVU und Umweltschutz). Text in German. Elektrizitaetswirtschaft, 72(16):581-586, Aug. 1973. 3 refs.

General problems and possibilities of air pollution control in electric power plants are discussed. Dust emissions from coal-firing power plants have been already solved by the use of electrostatic precipitators that reach efficiencies of up to 99%. Despite the considerable increase in the energy generation during the 1950-1970 period, the quantity of the dust emitted fell to 1/5 of the 1950 value. The sulfur dioxide emissions have changed little, or even decreased, during the same period due to the switch to fuel oil and natural gas from coal, and to the use of low-sulfur fuel oils. Fuel desulfurization is preferred to flue gas desulfurization by power plants for technical and economic reasons. Flue gas desulfurization, for which there is no technically perfect solutions as yet, is regarded as a foreign operation in electricity generation. The increased use of nuclear energy will have a powerful impact on the abatement of power plant-generated emissions, and so will that of electric heating and the cooling of electricity generation with remote heating.

37962

APTIC NO. 61270

Spangler, Carl David, Jr.

ANTIPOLLUTION DISPOSAL OF SOUR REFINERY GAS WITH SULFUR RECOVERY. (Assignee not given.) U. S. Pat. 3,773,912. 3p., Nov. 20, 1973. 8 refs. (Appl. Dec. 10, 1970, 6 claims).

A process is described for passing sour refinery gas containing hydrogen sulfide and ammonia over a catalyst comprising iron or both cobalt and molybdenum to convert the ammonia to hydrogen and nitrogen. The gas is then passed to a Claus type

sulfur recovery process where the H₂S is converted to sulfur. Optionally, the stream, subsequent to the dissociation of the ammonia, is passed to an amine absorber, and the H₂S regenerated from the amine is then passed to a Claus sulfur recovery process. Thus, atmospheric pollution from sulfur compounds and nitrogen oxides is abated. Previous Claus type processes allowed NO_x to be formed when the sulfur recovery process tail gas containing unconverted ammonia was incinerated. This improved process allows the Claus process to be employed to recover sulfur from sour refinery gas streams which contain both H₂S and NH₃. (Author abstract modified)

37963

APTIC NO. 60591

Staeger, Hermann

PROCESS FOR THE TWO-STAGE CONVERSION OF CARBON MONOXIDE-CONTAINING GASEOUS MIXTURES. (Verfahren zur zweistufigen Konvertierung kohlenmonoxidhaltiger Gasgemische). Text in German. (Heinrich Koppers GmbH, Essen (West Germany)) W. Ger. Pat. 1,567,613. 4p., Sept. 27, 1973. 6 refs. (Appl. May 27, 1964, 1 claim).

A process for the final desulfurization and for the two-stage conversion of carbon monoxide-containing gases into hydrogen-rich gas is described. The raw gas, possibly after preliminary desulfurization, is lead through the first conversion stage at a temperature of 350-550 C in the presence of water vapor, after which it is subjected to hot desulfurization, and is cooled to the second-stage conversion temperature of 180-260 C by the addition of water. The gas from the second-stage conversion contains less than 1% CO and over 60% hydrogen, with the rest being carbon dioxide. Hot desulfurization to a residual sulfur content of 1 ppm is done by means of a manganese-containing catalyst obtained by imbibing pumice with a manganese nitrite solution.

37964

APTIC NO. 61275

Steuernagel, Walter

COLLECTOR ELECTRODE FOR ELECTROSTATIC PRECIPITATOR. (Metallgesellschaft Aktiengesellschaft, Frankfurt (West Germany)) U. S. Pat. 3,755,991. 5p., Sept. 4, 1973. 9 refs. (Appl. June 17, 1971, 3 claims).

A collector electrode for an electrostatic precipitator is described. It has strips having spaced apart beads extending transversely to a rapping or jolting bar. The strips are placed symmetrically about a median transverse plane and have edges profiled with trapezoidal cross-section and legs cooperating with the legs of adjacent or contiguous strips to define labyrinth seals. This electrode avoids disadvantages of prior types of electrodes and is capable of being vibrated with a minimum of damping and distortion. It promotes efficient dust collection, can be installed in a simple manner at low cost, and has a low manufacturing cost.

37965

APTIC NO. 60539

Tadokoro, Tomoo, Motoyuki Hayashida, and Shigetake Yoshimura

EXHAUST GAS PURIFIER FOR INTERNAL COMBUSTION ENGINES. (Auspuffgas-Reinigungsvorrichtung fuer Brennkraftmaschinen). Text in German. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) W. Ger. Pat. 2,011,260. 4p., May 24, 1973. 4 refs. (Appl. March 4, 1970, 4 claims).

An exhaust gas purifier is described in which additional air is fed by a pump, dependent on the engine rpm, via an automatic valve which is spring-loaded toward the closure position. The closure body of the valve is connected to an auxiliary valve body which acts in the opposite direction and has a passage opening so that with increasing rpm, the valve is partly closed by the auxiliary body and the amount of air supplied can be reduced.

37966

APTIC NO. 61470

Takahashi, Eiji

NO_x REMOVAL TECHNIQUES FOR FIXED COMBUSTION SYSTEM FLUE GASES. (Kotei nensho sochi haigasu no NO_x jokyo gijutsu). Text in Japanese. Maruzen Sekiyu Giho (Maruzen Oil Tech. Rept.), no. 18:1-9, 1973. 23 refs.

The formation mechanism of nitrogen oxides; NO_x absorption by alkali, magnesium hydroxide, ammonium salt, and sulfite; NO_x oxidation; catalytic reduction by methane, hydrogen, and carbon monoxide; and an NO_x selective reduction method by ammonia, hydrogen sulfide, carbon monoxide, or hydrogen are discussed. To select a denitration process for combustion gas, a high elimination rate, lack of secondary pollution, the simultaneous treatment of sulfur oxides, a large capacity, an easy operational procedure, and a low installation and operational cost will be desirable. To fulfill these conditions, methods having quick reactions, lack of interference by coexisting SO_x, oxygen, steam, and dusts, simplicity, and small size must be selected. To avoid the secondary pollution from by-products, the SO_x recovery in the form of single sulfur and the NO_x recovery in the form of nitrogen will be ideal. At the present time, the selective reduction method is the most desirable since it can be achieved by a relatively small amount of reducing agent at a low temperature; however, when using CO or H₂, catalysts can be inactivated by sulfur and HS can cause a secondary pollution. The use of ammonia is the most hopeful method at present. The future problem will be the treatment of ammonia and ammonium salt in the combustion gas, and the understanding of the interference mechanism by co-elements in the combustion gas. Another promising method is the selective reduction by HS; in this case the future question is how to increase the Claus reaction rate.

37967

APTIC NO. 61305

Takashima, Yoichi, Yoshitami Endo, and Kenya Saito

CENTRIFUGAL GAS SEPARATOR. (Tokyo Shibaura Electrical Co., Ltd., Kawasaki (Japan)) U. S. Pat. 3,774,387. 7p., Nov. 27, 1973. 4 refs. (Appl. June 16, 1971, 8 claims).

A centrifugal gas separator is described which employs a cylindrical centrifuge drum having a hollow shaft mounted on suitable bearings within a housing. This separator has none of the disadvantages of prior art. It is capable of rotating a mixed gas in drum at a velocity greater than that of the drum. Supply means are provided for feeding a mixed gas to be separated into the drum. The supply means has openings located radially near the inner periphery of the drum and axially at approximately the center of the drum. Each opening in the supply means communicates with the hollow shaft. Thus, the mixed gas to be separated enters the centrifuge drum near the inner periphery, and the gas is then able to attain a relatively high angular velocity, whereby the separating power of the centrifuge is elevated. (Author abstract modified)

37968

APTIC NO. 61475

Takayama, O., H. Kato, T. Suzuki, Y. Oshio, and M. Seto

INFLUENCES OF AIR POLLUTION ON CHILDREN'S HEALTH. (Taiki osen ga jido no kenko ni oyobosu eikyo). Text in Japanese. Nihon Kikan Shokudoka Gakkai Kaiho (J. Japan. Broncho-Esophagology Soc.), 24(5):199, Oct. 1973. (Presented at the Japanese Broncho-Esophagological Society, Annual Meeting, 25th, 1973.)

According to the investigation on the morbidity of upper airway diseases of schoolchildren who belong to the schools located in highly, moderately, and nonpolluted areas in Tokyo including a remote island, the following tendencies were found. In highly and moderately polluted areas the morbidity of diseases in the nasal cavity, pharynx, and larynx, especially of paranasal sinusitis and pharyngolaryngitis was high. The diseases were found more in boys than girls. Detailed examinations showed that the most numerous diseases were

found in the pharynx, followed by larynx, then by nasal cavity. It is not clear what disease prevails as the degree of air pollution increases.

37969

Tamura, Zensuke and Hishinuma Yukio

APTIC NO. 60525

DEVICE FOR THE REMOVAL OF SULFUR OXIDES FROM WASTE GASES. (Vorrichtung zum Entfernen von Schwefeloxiden aus Abgasen). Text in German. (Hitachi, Ltd., Tokyo (Japan)) W. Ger. Pat. 1,619,879. 7p., June 20, 1973. 2 refs. (Appl. Sept. 15, 1967, 1 claim).

A device for the adsorptive removal of sulfur dioxide and sulfur trioxide from flue gases generated by gas turbines, boilers, and furnaces is described. The device constitutes an upright cylindrical adsorber subdivided into sections and to elemental chambers with activated carbon used as the adsorbent. After the SO₂ and SO₃ are adsorbed by the activated carbon, the latter is regenerated by washing with water or other solvents, and sulfuric acid with a concentration of 30-40% is obtained. Following regeneration, the damp activated carbon is dried by means of heated gas passing through the adsorbent beds. The adsorber can be divided into adsorption, regeneration, and drying zones as required. The waste gas to be purified and the hot drying gas passes through the adsorbent bed in zigzag motion.

37970

APTIC NO. 61360

Tamura, Zensuke, Yukio Hishinuma, and Norio Arashi

EXHAUST GAS DESULFURIZING METHOD AND APPARATUS. (Hitachi, Ltd., Tokyo (Japan)) U. S. Pat. 3,772,854. 5p., Nov. 20, 1973. 3 refs. (Appl. July 16, 1971, 5 claims).

A method of and an apparatus for removing sulfur oxides (sulfur dioxide and sulfur trioxide) contained in combustion gases by adsorption on activated carbon is discussed. In a series operation of removing SO₂ and SO₃ in the exhaust gas by adsorbing them on activated carbon and washing the activated carbon with water, the resultant dilute sulfuric acid is subjected to heat exchange with part of the exhaust gas, whereby the dilute H₂SO₄ is concentrated, and the temperature of the exhaust gas is lowered. The cooled exhaust gas is mixed with the main flow of uncooled exhaust gas to adjust the temperature of the whole exhaust gas to a level optimum for enabling the activated carbon to exhibit its highest adsorbing activity, and then the exhaust gas is contacted with the activated carbon, whereby the sulfur oxides and other harmful gases contained in the exhaust gas are removed, and the exhaust gas is released into the atmosphere at a temperature that will not cause smoke pollution. This invention is an improvement of the conventional method with increased efficiency. Instead of using the energy from the external heat source for heat-concentrating the dilute sulfuric acid resulting from washing the SO₂-adsorbed activated carbon with water, the sensible heat part of the exhaust, branched from the main exhaust gas flow, is utilized to concentrate the dilute sulfuric acid and to collect it as sulfuric acid of high concentration. (Author abstract modified)

37971

APTIC NO. 61138

Tanaka, Kenichi and Tsunejiro Fukami

DISPOSAL METHOD OF POWDERS PRODUCED DURING EXHAUST GAS DISPOSAL PROCESS. (Haigasu shori kotei de seisei sareru funtai no shori hoho). Text in Japanese. (Seitetsu Kagaku Kogyo K.K., Hyogo (Japan)) Japan. Pat. Sho 48-43262. 4p., Dec. 18, 1973. (Appl. April 16, 1970, 1 claim).

The current method of treating the stack gases from heavy oil combustion with ammonia produces a fine powder that is extremely light and difficult to handle. An industrially applicable method to granulate the powder into larger grains of greater mechanical strength for handling ease is described here. The

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powder particulates are mixed with a basic inorganic substance (such as ammonium hydroxide, ammonium carbonate, sodium hydroxide, sodium carbonate, or potassium hydroxide) to from 2-120 wt% and water to from 10-50 wt%, after which the mixture is dried while being granulated in a rotary drum or vibration type granulator.

37972

APTIC NO. 61581

Tanaka, Ryoichi

CONTROL OF NOX BY THE IMPROVEMENT OF COMBUSTION FACILITIES. (Nensho shisetsu ni yoru NOx no seigyō). Text in Japanese. Kankyo Sozo (Environment), 3(12):48-57, Dec. 1973.

Various commercial burners which reduce the emission of nitrogen oxides are described. Burners suitable for the combustion of oils and gases in tubular furnaces which are powered by self-recirculating gasification can reduce the emission of NOx from residual oils to 166-252 ppm. The NOx content in refinery gases emitted from a combustion rate of 272,000 kcal/min was 65 ppm. Another burner using the relationship between the concentration of the reactants, temperature, and residence time to regulate the emission of NOx reduces emissions to 40% that of conventional burners. A burner using natural gas reduced NOx emissions to 87-100 ppm.

37973

APTIC NO. 61273

Teller, Aaron J.

PROCESS FOR RECOVERING GASEOUS HF FROM GASEOUS EFFLUENTS. (Wellman-Lord, Inc., Lakeland, Fla.) U. S. Pat. 3,773,633. 7p., Nov. 20, 1973. 5 refs. (Appl. March 13, 1970, 23 claims).

A process is described for recovering hydrogen fluoride from gases by contacting the gases with alumina pretreated with sodium hydroxide, potassium hydroxide, or their mixture. This process can be used to recover gaseous HF from the waste gases produced in the manufacture of aluminum by the electrolytic process. The recovered HF can be reused in the electrolytic process. In a modification of this invention, the gases can be scrubbed by inertial impaction to remove particulates before they are placed in contact with the pretreated alumina for HF removal. (Author abstract modified)

37974

APTIC NO. 61409

Terabe, M.

TREND IN CONTROL AND RESEARCH DEVELOPMENT OF NITROGEN OXIDES ABROAD. (Kaigai ni okeru NOx kisei to kenkyū kaihatsu no doko). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 11(6):9-16, Dec. 1973. 15 refs.

Twenty national, state, and municipal institutes, universities, and private research institutes, in the U. S., France, Great Britain, and West Germany were inspected by the director of the Pollutions Control Bureau, Kawasaki City. Control measures and technology concerning nitrogen oxides in the U. S. are mainly described. Los Angeles County has the most rigid regulation on NOx, followed by New York City. There is no emission control on NOx from combustion facilities in France, Great Britain, or West Germany. Briar research was going on on NOx emission from boilers in the U. S. at the Combustion Engineering Co., Southern California Edison, Environmental Protection Agency and ESSO Research and Engineering Co. In Great Britain, study on decreasing NOx from combustion of natural gas was being carried out by Shell Research, Ltd. Staged combustion and recycling of fuel gas are said to be effective, when used together, in the control of NOx. Selection of fuel is also necessary. Nitrogen in the fuel and nitrogen in the atmosphere are two contributing factors to NOx emission, and the former cannot be ignored. Therefore, natural gas, which does not contain nitrogen, is desirable. Although Los Angeles switched to natural gas (almost 80%), it is difficult to

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secure that much natural gas. Efforts are also being made in Great Britain, France, and West Germany to introduce more natural gas. For large stationary sources such as boilers it would be most effective to switch from fuel oil to gas fuel, and to adopt two-stage combustion and recycling of fuel gas.

37975

APTIC NO. 61326

Thirkell, Harry

REMOVAL OF ACIDIC GASES FROM GASEOUS MIXTURES. (Assignee not given.) U. S. Pat. 3,773,895. 11p., Nov. 20, 1973. 6 refs. (Appl. Dec. 15, 1971, 11 claims).

A method for removing acidic gases such as carbon dioxide and hydrogen sulfide from gaseous mixtures is described. It is particularly applicable for obtaining a purified gaseous mixture having a low concentration of acidic gas or gases. This invention is an improvement over processes for scrubbing gases with an absorbent liquor where the spent liquor is regenerated by heating and stripping with steam, resulting in regeneration of the liquor and evolution of CO₂ and/or H₂S. In this method, the gas is passed through an absorption zone of a hot aqueous solution of a nonvolatile reagent such as potassium carbonate or tripotassium phosphate and a volatile reagent such as monoethanolamine or diethanolamine to remove a major fraction of the acidic gases. Then the gas is passed to a second absorption zone of a cooled aqueous solution of the same volatile reagent. The spent solutions from each absorption zone are passed to regeneration zones to strip off the acidic gases. The stripping steam is discharged. The regenerated solutions are returned to their respective absorption zones. (Author abstract modified)

37976

APTIC NO. 56426

Thompson, R. E., D. W. Pershing, and E. E. Berkau

CATALYTIC COMBUSTION, A POLLUTION-FREE MEANS OF ENERGY CONVERSION? Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab., Program Element 1A2014, Rept. EPA-650/2-73-018, 59p., Aug. 1973. 17 refs.

NTIS: PB 223002

A study of the potential of catalytic combustion for pollution-free domestic heating applications is presented. Nine of the 14 commercially available catalytic heaters tested operated on propane, while the other five operated on lead-free gasoline. Examination of substrate thickness, catalyst type and concentration, and fuel rate indicated that hydrocarbon emissions could not be reduced to levels now possible with conventional domestic heating units. Nitrogen oxide emissions, however, were very low from nearly all heaters. Substrate thickness and catalyst treatment had little effect on hydrocarbon emissions in controlled testing. Some units produced very high levels of carbon monoxide which was preventable when controlled test results and performance of other units were analyzed. More research is necessary to eliminate the high hydrocarbon emissions before catalytic heating can be considered a viable domestic heating alternative. (Author abstract modified)

37977

APTIC NO. 61390

Toda, Yoshio, Mitsutaka Konno, and Masao Nakajima

APPARATUS FOR REDUCING HYDROCARBON CONTENT OF EXHAUST GASES DURING DECELERATION. (Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,756,208. 15p., Sept. 4, 1973. 7 refs. (Appl. Feb. 8, 1972, 1 claim).

An air pollution preventive system is described which is used in combination with an automotive internal combustion engine having a carburetor with idle and low-speed circuit. This system comprises a deceleration circuit to supply, independently of the idle and low-speed circuit, an air-fuel mixture to the engine in an amount and mixture ratio suitable for the engine operation during deceleration. The deceleration circuit is closed and opened by a valve which is controlled upon various

driving conditions of the motor vehicle, particularly vehicle speeds, angular positions of the throttle (or motions of the accelerator pedal), positions of the clutch pedal, vacuums in the intake manifold, or combinations of two or more of these variables. Usually, engines supply air-fuel mixtures determined to suit idling operations which give low combustion efficiency and misfiring during deceleration. This causes hydrocarbons to be emitted. This new method for changing the air-fuel ratio during deceleration eliminates the emission of hydrocarbons. (Author abstract modified)

37978

APTIC NO. 61879

Todo, Takayuki

NITROGEN OXIDES ATTENUATION METHODS FOR FIXED COMBUSTION SYSTEM FLUE GASES. (Kotei nensho sochi hai gusu-chu no chisso sankabutsu teigenho). Text in Japanese. Shokubai (Catalysts), 15(6):182-193, 1973. 69 refs.

The formation of nitrogen oxides by combustion is analyzed chemically and mathematically. The elimination methods by catalytic decomposition, catalytic reduction, adsorption, and absorption are examined. Denitrization of flue gas by catalysts has been examined using various catalysts, but in actual denitrization of flue gas, only a very low rate (10%) denitrization was achieved using copper oxide at 450-1350 F. Experimental use of CuO and alumina or cerium and alumina has produced relatively high decomposition rates. Methane or natural gas as a reduction agent is already in use industrially for nitric acid factory flue gas; but they have not been used for reduction of combustion gas NO_x. The reason may be the extremely high reaction temperature and the limited use of a platinum catalyst which is sensitive to sulfur compounds. The use of carbon monoxide or hydrogen as a reduction agent is being studied. A selective reduction method using ammonia oxidation has been reported. Reduction is possible at a high temperature and reduces NO selectively in the presence of SO₂; but the only possible catalyst is a platinum-group metal and the sulfur compounds in flue gas have to be less than 1 ppm for this method to be effective. The NO reduction is limited to a narrow range of high temperatures. Both adsorption and absorption methods for NO_x are extremely difficult and ineffective.

37979

APTIC NO. 61280

Tourtellotte, John F., John S. Negra, Abe Warshaw, and John F. Villiers-Fisher

INTEGRATED ENGINE EXHAUST EMISSION CONTROL SYSTEM. (Chemical Construction Corp., New York) U. S. Pat. 3,757,521. 9p., Sept. 11, 1973. 8 refs. (Appl. April 27, 1971, 20 claims).

An integrated method for controlling and preventing the emission of noxious components in engine exhaust during all the various phases of the engine operating cycle, such as startup, normal operation, overload, and when the engine exhaust gas is at an abnormally elevated temperature is described. It can be used in catalytic exhaust gas treatment systems in internal combustion engines which oxidize or reduce hydrocarbons, carbon monoxide, or nitrogen oxides. The invention solves the problem that catalytic system must be hot before they operate efficiently by having hardware and a control system to warm the system to operating temperatures in a short time. A cooling system prevents temperature damage. The principal advantage of the invention is that the emission of noxious components in the exhaust gas is prevented during all stages of the engine operating cycle. The CO, NO_x, and HC are converted into harmless nonpollutants such as water vapor, carbon dioxide, and nitrogen. The present internal combustion engine remains intact, and the control system replaces the exhaust muffler system of the present engine. It removes pollutants and eliminates noise and air pollution. The system overcomes the problem of cold engine startup, is simple in operation, compact in size, low in initial cost, and low in maintenance.

The system employs catalyst compositions consisting of non-noble metals, which are not classified as pollutants or harmful to life. (Author abstract modified)

37980

APTIC NO. 61289

Toyonaga, H. and R. Machii

NOX EMISSION CONTROL OF GAS FUELED INDUSTRIAL FURNACES. (Gas daki kogyoro ni tei NOx taisaku). Text in Japanese. Preprint, Combustion Inst. (Japan), p. 143-146, 1973. (Presented at the Symposium on Combustion, 11th, Tokyo, Japan, Dec. 6-7, 1973, Paper 39.)

An attempt to control the nitrogen oxides emission of gas-fueled metallurgical furnaces is described. Three types of burners, the long flame, short flame, and the high speed type were examined using a town gas of 4500 kcal/cu m hr at combustion rate of 100 cu m/hr and a capacity of 560,000 kcal/cu m hr. The long flame burner produces less NOx than the short flame type, and the high speed burner was the least dependent upon furnace temperature. In order to control NOx emission, a bias combustion containing the characteristics of hot gas recirculation and two-stage combustion was examined. In this method, the flame is divided into two parts, letting the one burned at air-fuel ratio less than 1 (fuel rich) corresponding to a two-stage combustion and the other at a ratio higher than 1 (air rich) corresponding to a hot gas recirculating combustion, while the total air-fuel ratio is kept around 1. The emission of NOx was reduced by 50% by operating the first burner at a ratio of 0.5 and the other at 1.5. In this experiment, two long flame type burners of 1,100,000 kcal/hr were operated at a furnace temperature of 1290-1320 C and a total of air-fuel ratio of 1.12-1.19 in a furnace of 2000 mm wide, 3200 mm long, and 1600 mm high.

37981

APTIC NO. 61253

Tumanevskii, A. G.

SOME METHODS FOR DECREASING THE CONCENTRATION OF NITROGEN OXIDES IN THE COMBUSTION CHAMBERS OF GAS TURBINE PLANTS. Thermal Eng. (English translation from Russian of: Teploenergetika), 20(6):40-44, June 1973. 6 refs.

Special rig trials with gas turbine plants were conducted to investigate the features of the formation of nitrogen oxides in combustion chambers and to estimate the influence of main operational and design parameters on the final yield of nitric oxide and nitrogen dioxide. Analysis of industrial tests on gas turbine plant combustion chambers with combustion of gaseous fuel indicated that the use of multiburner frontal arrangements with a primary air excess factor equal to or greater than 1.6 to 1.8 is effective in preventing the formation of nitrogen oxides as well as intensifying and improving the combustion process characteristics. Investigations with combustion of three types of fuel oil revealed that another method of decreasing the concentration of nitrogen oxides is the use of highly forced combustion chambers with successive supply of air to the combustion zone. Water injection by a mechanical atomizer directly into the combustion zone resulted in a threefold NOx decrease with a water flow rate of 100 kg/hr and 2.5% of the air flow passing into the chamber.

37982

APTIC NO. 61243

Ueda, Susumu

ODOUR CONTROL FOR BATCH DIGESTERS OF KRAFT PULPING PROCESS-ILLUSTRATION OF GASHOLDER. (Bacchigama ni okeru shuki taisaku ni tsuite-gaso horuda shiyo no rei). Text in Japanese. Kami-Pa Gikyoshi (J. Japan. Tech. Assoc. Pulp Paper Ind.), 28(2):72-75, Feb. 1973. 6 refs.

A special gas holder was installed in a pulp mill to capture odorous gas from batch digesters of Kraft pulping process. The initial purpose of the holder was to capture high concen-

tration odorous gases which are emitted cyclically from the digesters and to average out the concentration to eliminate peaks. Originally, the stored gas was emitted without any treatment and the odor was offensive. Therefore the gas was led to the black liquor oxidation tower and part of odor was absorbed in alkaline solvent. The gas is contacted with dilute black liquor with fresh air for oxidation. Hydrogen sulfide is completely absorbed; dimethyl disulfide is absorbed more than 90%. Methyl mercaptan is difficult to absorb and a considerable amount is still emitted in the air. Even if it is absorbed, there is a possibility of re-emission in the atmosphere. The most effective terminal treatment of digester blow gas is probably combustion. Studies and plans are presently made for a boiler or a kiln for this process. This special gas holder was designed for a boiler or a kiln for this process. This special gas holder was designed in cooperation with another manufacturer. The structure is extremely simple and works on the principle of a balloon. Special care was taken for the life of the canvas material for the balloon, the upper limit of the blow gas temperature, and the gas capacity. The capacity is 130 cu m, the maximum temperature is 90 C, and the gas break maximum pressure is 50 mm aq.

37983

APTIC NO. 54926

Uekihara, T.

DESULFURIZATION IN CEMENT MANUFACTURING PROCESS. (Semento seizo purosesu ni okeru datsuryu). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(11):1091-1100, Nov. 1973.

Desulfurization and dust control for the exhaust gas of a portland cement plant is discussed. Cement production has increased by the use of increasing kiln capacity, new firing methods, using heavy oils instead of coal, and computer control. Dust is usually recovered for future use by an electrostatic precipitator. The cement kiln itself works as a sulfur oxides removal method because the calcium oxides from raw cement reacts with SOx to give calcium sulfate. Desulfurization ratios are: 70-80% using a wet system kiln with a filter, 80-90% for a wet system without a filter, 70-90% with a dry system and a boiler, 90-95% with a Leport kiln, and 95-100% with a suspension pre-heater attached to the kiln.

37984

APTIC NO. 54827

Ueno, T.

ERE FLEXICOKING. (ERE shiki jushitsu-yu bunkai datsuryu prosesu). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 16(10):844-847, Oct. 1973.

The flexicoking thermal cracking desulfurization process gives low sulfur oil from difficult to desulfurize vacuum distillation bottom oil. This process combines GO-fining and wet desulfurization of coke gas. Metals injurious to catalysts are concentrated in the coke and shuttled out from the GO-fining process. The hydrogen sulfide from coke gasification is removed by wet desulfurization. The process produces 85 vol% liquid products, 6-7% fuel gas, 0.1% sulfur fuel, 99% removal of metals, and 80-90% nitrogen removal. Costs are cited.

37985

APTIC NO. 59460

Vogel, G. J., E. L. Carls, J. Ackerman, M. Haas, J. Riha, C. B. Schoffstoll, J. Hepperly, and A. A. Jonke

REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED-BED COMBUSTION AND REGENERATION OF SULFUR-CONTAINING ADDITIVES. Argonne National Lab., Argonne, Ill., Environmental Protection Agency Interagency Agreement EPA-1AG-0020, Program Element 1A2013, Argonne ANL/ES-CEN-1005, EPA-R2-73-253, 73p., June 1973. 4 refs.

NTIS: PB 227058/AS

Fluidized bed combustion was investigated as a means of removing from the gas phase nearly all of the atmospheric pollutants of sulfur and nitrogen compounds generated during the combustion of fossil fuels. Particulate lime solids (additives) are introduced into the fluidized bed and react with the sulfur oxides and sulfur compounds formed during combustion. Information was obtained on pollution control by fluidized bed combustion of oil with an excess of air and by the combustion of coal with a deficiency of air; the thermodynamics of several proposed processes for regenerating additives; and experimental regeneration of the S-containing additive by the two most promising processes, a one-step reductive decomposition of calcium sulfate and a two-step reduction-carbon dioxide/water regeneration procedure. (Author abstract)

37986

APTIC NO. 61150

Vogt, Heinhut

ROTARY SPRAY-SCRUBBER, A HIGH-EFFICIENCY APPARATUS FOR VENT AIR PURIFICATION. (Der Rotations-Spruehwäscher, ein leistungsfähiger Apparat fuer die Abluftreinigung). Text in German. CZ-Chem. Tech., 2(9):373-374, Sept. 1973. 5 refs.

A high-efficiency rotary spray scrubber (originally developed for the drying of chlorine by means of sulfuric acid) and its possible uses are described. The rotary spray scrubber is composed of a tank in whose center a perforated spray cone is rotated around a vertical axis. The spray cone sprays fine liquid droplets nearly horizontally at high velocity which increases the rate of material transfer from the gaseous into the liquid phase and the renewal rate of the droplet surface. The rotary spray scrubber is especially suitable for the cleaning of large volumes of gases with low pollutant concentrations at low pressure loss. It is also suitable for the use of special spray liquids for the chemical destruction of the gas components absorbed.

37987

APTIC NO. 61167

Wada, Takero, Kazuo Okada, and Mamoru Oyama

DEODORANT. (Dasshuzai). Text in Japanese. (Takeda Chemical Industries, Ltd., Osaka (Japan)) Japan. Pat. Sho 48-43280. Sp., Dec. 18, 1973. (Appl. June 3, 1970, 1 claim).

A new method of swelling vermiculite in peroxide gives an unusually powerful deodorizing effect. The new vermiculite (Vermiculite EP) is manufactured by mixing vermiculite with a peroxide to 150 C or cracking it by addition of a cracking agent. The grain size of the resulting vermiculite ranges from 1 to 7 sq mm. The ratio of peroxide to vermiculite is preferably between 10 to 100 wt%. The Vermiculite EP has a volume 20 times as large as the original vermiculite, the swelling being adjustable to a factor of from 5 to 50, depending on conditions. Replacement of magnesium ions by sodium ions can be undertaken by ion exchange processes to strengthen the deodorizing power of the vermiculite.

37988

APTIC NO. 61463

Weber, Ekkehard

THE REMOVAL OF GASEOUS AND SOLID COMPONENTS FROM WASTE GASES. (Die Abscheidung gasfoermiger und fester Komponenten aus Abgasen). Text in German. Umwelt Aktuell, no. 4:45-59, 1973. (Presented at the Congress Umwelt 72, Stuttgart, June 30-July 9, 1972.)

The methods for gas cleaning can be divided into two main groups, into dust collection and collection of gaseous components. In 1972 the Federal Republic of Germany invested \$125 million in dust collectors. About 70% of this money was spent for so called high-capacity collectors with which high collection efficiencies can be achieved. The electrostatic precipitator, the scrubber, and cloth filters belong to this group. Cloth collectors always achieve high collection efficiencies so that the lack of an equation for calculating the collec-

tion efficiency does not matter much. It is important to select the adequate material for cloth filters. Electrostatic precipitators are costly and the estimation of the collection efficiency is difficult, while for scrubbers an advance theoretical calculation of the collection efficiency is not even approximately possible. For the removal of gaseous components, mainly absorption, adsorption and chemical conversion (thermal or catalytic afterburning) are applied. A brief discussion of the basic principle of each method is given. The more important flue gas desulfurization processes such as the additive method, the Bischoff, Grillo, Still, Reinluft and Sulfacid processes are reviewed.

37989

APTIC NO. 61319

Weber, Rainer Jorg

INTERNAL COMBUSTION ENGINE EXHAUST GAS EMISSION CONTROL APPARATUS. (General Motors Corp., Detroit, Mich.) U. S. Pat. 3,758,278. 3p., Sept. 11, 1973. 6 refs. (Appl. Feb. 22, 1972, 4 claims).

A catalytic converter for reducing engine exhaust emission is described. A valve unit controls the flow of exhaust gases either directly to the converter or indirectly through a cooling loop to a catalytic converter. It includes a pair of parallel tangentially disposed conduits. The inlet of one conduit receives exhaust gases from the engine, the outlet of the other conduit discharges the gases to the converter, and a cooling loop connects the outlet to the inlet. An opening in the partition between the conduits joins the conduits intermediate of their inlets and outlets. A valve member controls flow to alternatively direct exhaust flow either from the inlet of the one conduit to the outlet and through the cooling loop or from the inlet of the one conduit through the opening to the outlet of the other conduit. This invention enables the catalytic converter to operate at maximum efficiency both when the engine is relatively cool at startup and when the engine has reached its normal operating condition. (Author abstract modified)

37990

APTIC NO. 61330

Welch, Wilson A. and Alan E. Revell

MANDREL ASSEMBLY FOR AIR FILTER APPARATUS. (American Air Filter Co., Inc., Louisville, Ky.) U. S. Pat. 3,774,373. 6p., Nov. 27, 1973. 11 refs. (Appl. Jan. 28, 1972, 4 claims).

An automatic air filter of the type employing an elongated air cleaning web adapted to be progressively advanced longitudinally across an air stream passage to clean dirty air as it passes through such a passage is described. It is particularly suitable where a supply of filter media is furnished on a roll and is manipulated into a roll packaged for disposal. Prior spindle arrangements were cumbersome, complex to construct and to maintain, and of limited use. The present invention provides a spindle arrangement which can be utilized in the rewind zone and a mandrel assembly for fastening end plates to a tubular core to fabricate a spindle, which permits simple, efficient manipulation of used filter media into a roll package for disposal. The invention is straightforward, inexpensive, readily constructed, and easily maintained. It can be readily converted to use in the supply zone if needed. (Author abstract modified)

37991

APTIC NO. 61333

Whittaker, Henry C.

ANTI-POLLUTION EXHAUST SYSTEM FOR AN INTERNAL COMBUSTION ENGINE. (Assignee not given.) U. S. Pat. 3,769,798. 6p., Nov. 6, 1973. 10 refs. (Appl. March 22, 1972, 4 claims).

An anti-pollution exhaust system for an internal combustion engine in which exhaust gases are first diluted and then fed through a spiral pipe serving as a centrifugal separator to separate the heavier gaseous material from the lighter gaseous material is described. The heavier gaseous material is fed back to the air inlet of the carburetor to be burned in the engine.

Fumes from the crankcase are fed to a condensing unit in which the liquid oil is retained until drained off with the remaining fumes fed to the air inlet of the carburetor to be burned in the engine. This system eliminates air pollution while simultaneously increasing gas mileage. The separator operates either wet or dry, but is more effective wet. (Author abstract modified)

37992

APTIC NO. 61372

Wiedemer, Karl

CONSERVATION OF CLEAN AIR: AGAINST DANGEROUS FLUID MISTS. (Gegen gefährliche Flüssigkeitsnebel). Text in German. *Tech. Umweltmag.*, (6):40-42, Dec. 1973.

Of all pollutants emitted into the atmosphere mists pose one of the most difficult problems because of the low sinking speed of the light droplets. They spread rapidly and far. For droplets of 0.1 mm diameter the sinking speed is 24 cm/sec, of 0.01 mm diameter 0.3 cm/sec and of 0.001 mm 0.003 cm/sec. For a separation of the mists from the air an acceleration and sudden deflection is needed. The droplets then fall out by impaction on a wall. In many cases the mist-laden air is passed through a cyclone where guide vanes impart a rapid rotary movement on the air. The droplets are thrown to the wall by centrifugal forces. Other separators take advantage of the centrifugal forces occurring at points of sharp deflection. An example for this are columns packed with Raschig rings. Lamella separators, too, have a good collection efficiency for mist droplets with diameters of less than 0.01 mm. The pressure loss in these separators is relatively low (mostly less than 100 mm water). For evaluation of the efficiency of a separator the size distribution of the droplets must be known. The determination of the size distribution with a test set-up and test mist is illustrated.

37993

APTIC NO. 60633

Wiemann, Hans Juergen and Wolfgang Modersitzki

DUST SEPARATOR. (Abscheider). Text in German. (VEB Kombinat Luft- und Kältetechnik, Dresden (East Germany)) W. Ger. Pat. Appl. 2,233,759. 11p., Feb. 22, 1973. (8 claims).

A electrostatic dust precipitator for the removal of high dust concentrations from industrial waste gases is described. The electrostatic precipitator is especially suitable for the separation of dusts with very high or very low electric resistivity. Dust is separated by passing the gas through a tube containing vertical discharge electrode rows. Parallel to them is a grounded wire gauze deposition electrode, permeable for the gas flow, which fills the entire tube cross section. The dust particles are charged by a corona-generating high voltage at the discharge electrodes, and precipitated at the deposition electrodes. The dust cake formed acts as an additional filter. The deposition electrode also may be in the form of wire screen or perforated plate.

37994

APTIC NO. 61278

Williams, John K.

GAS CLEANING APPARATUS. (Central Texas Iron Works, Inc., Waco, Tex.) U. S. Pat. 3,755,851. 13p., Sept. 4, 1973. 1 ref. (Appl. Oct. 28, 1971, 33 claims).

An apparatus is described for separating particulates from a stream of gas, such as air. It includes a blower, a solids collection receptacle, and ducting connecting the blower and the receptacle and communicating with a source of gas with entrained particulate matter; the blower, receptacle, and ducting provide a substantially closed system in which gas is recirculated. The solid material is separated from the circulating gas and is deposited in the collection receptacle. A portion of the circulating gas, not exceeding 30% by volume, is bled from the circulatory system and discharged to maintain the average pressure at a low value to prevent leakage blow-out of gas and

entrained dust. A means for bleeding the gas from the system is situated within the structure housing the blower and a separation chamber. The collector is mounted so it can be moved away from the blower and the ducting housing structure so it can be tipped to dump accumulated solids. The gas cleaning apparatus is connected to a mobile surface sweeping equipment including a pick-up head which can regulate the flow of air from a pressure chamber against the surface being cleaned and into a suction chamber in the pick-up head. This invention is improved over previous systems because of the air bleed off system, which prevents dust or other solid matter from being blown out of the system. (Author abstract modified)

37995

APTIC NO. 61157

Wilson, M. J. G.

ATMOSPHERIC POLLUTION FROM FOSSIL FUELS.

Ann. Occupational Hyg., 16(4):349-352, Dec. 1973. 17 refs.

A general review of the production and control of atmospheric pollution from the burning of fossil fuels is presented in terms of choices between the type of fuel and type of combustion process employed, improving atmospheric dispersion by means of tall chimneys, pollution forecasting through estimation of meteorological parameters, the summation of many pollutants from various sources, and the effects of future energy demand on large-scale air pollution. Finite reserves of fuel imply limits to the potential production of air pollution in the future.

37996

APTIC NO. 61464

Yamanaka, Tatsuo

UTILIZATION OF CATALYSTS IN AIR POLLUTION CONTROL. SECOND SERIES, PART 8. (Zoku Kogai boshi gijutsu niokeru shokubai no riyō). Text in Japanese.

Kagaku Kogyo (Chem. Ind.), 24(11):1500-1509, Nov. 1973. 2 refs.

The use of catalytic converters for auto emission control and the prevention of catalyst degradation are discussed. The Tokyo Bureau of Environmental Protection has tested the performance of 11 kinds of catalysts. Noble metals performed better than other catalysts even when leaded gasoline was used. Some properties of the Engelhard Co. honeycomb catalyst are listed and its performance in the oxidation of hydrocarbon and carbon monoxide is discussed. The improved PTX-5 catalyst was tested with a 351 C.I.D. V8 engine car equipped with exhaust gas recirculation, air pump, and catalytic converter. It showed high HC removal efficiency. Catalyst degradation is mostly caused by sintering, particulate deposition, and interaction with lead, sulfur dioxide, halogens, and phosphorus compounds. In order to prevent catalyst degradation, air must be sent to the catalyst layer for 2 to 3 min immediately after the engine is turned off to disperse poisoning substances and prevent their deposition before cooling of the catalyst. Preferably the air should be sent to the catalyst until the temperature reaches 300 C.

37997

APTIC NO. 61465

Yanagihara, Shigeru

METHOD TO REDUCE HARMFUL CONTENTS OF EXHAUST GASES FROM SPARK IGNITION ENGINES.

(Hibana tenka kikan no haiki yugai seibun no genshohō).

Text in Japanese. (Director, Agency of Industrial Science and Technology, Tokyo (Japan)) Japan. Pat. Sho 48-8939. 2p., March 19, 1973. 1 ref. (Appl. March 27, 1967, 1 claim).

Concentration of combustibles contained in the exhaust gas of a spark-firing engine generally tends to be greater when the output torque is smaller. It is also a general rule that the exhaust gas emitted from the cylinder in the earlier stage of the exhaust period contains less combustibles than that emitted in the later stage. Taking advantage of this fact, a new method has been devised to reduce harmful contents of the exhaust

gas simply by changing closing time of the exhaust valve when the output torque or intake pipe pressure is small. More specifically, the exhaust valve is so arranged as to close sooner when the output torque is smaller. Thus, the gas containing more combustibles which would be otherwise emitted from the cylinder in the later stage of the exhaust period is held in the cylinder for recombustion. This arrangement not only reduces combustible contents of the exhaust gas but also lowers the maximum temperature of combustion, thus resulting in reduction of nitrogen oxides emissions. Since it also causes a decrease in the intake flow quantity without lowering the intake pipe pressure too much, the air/fuel mix ratio may be reduced with smaller throttle loss for a thinner mixture of gas. This further reduces the harmful contents of the exhaust gas.

37998

APTIC NO. 60903

Yergey, A. L., F. W. Lampe, M. L. Vestal, E. J. Gilbert, and G. J. Fergusson

GASIFICATION OF FOSSIL FUELS UNDER OXIDATIVE, REDUCTIVE, AND PYROLYTIC CONDITIONS. (FINAL REPORT). Scientific Research Instruments Corp., Baltimore, Md., Environmental Protection Agency Contract 68-02-0206, Program Element 1AB013, ROAP 21ADD04, EPA-650/2-73-042, SRI 72, 178p., Dec. 1973. 9 refs.

NTIS: PB 228 668/AS

Kinetic reaction data produced in a non-isothermal kinetics laboratory while gasifying selected types of coal under oxidative, reductive, and pyrolytic conditions are given. Types of coal included lignite and anthracite. Evolution of thermal decomposition products under study conditions was investigated at different fuel heating rates and gasification pressures. Gaseous product evolution rates, as the function of temperature, were graphed for different coals exposed to indicated gasification regimes. The evolution of such gaseous species as water, carbon monoxide, carbon dioxide, oxygen, sulfur dioxide, nitric oxide, hydrogen, methane, hydrogen sulfide, and acetylene was followed in conjunction with 13 different coal gasification reactions as identified previously and as identified in the course of this work. The kinetic reaction parameters, such as activation energy and frequency factors for these reactions, were calculated and presented earlier and in this report. Gaseous evolution data for oxidative reactions is presented in an appendix, including peak temperatures in the oxidative gasification of coal and in treatment of coke with carbon dioxide in air and the effect of water vapor on oxidative gasification of coal. Gaseous evolution data for pyrolysis experiments are presented showing peak temperatures for pyrolysis of coals and cokes heated at 30 deg/min in argon. Peak temperatures for reducing atmospheres of hydrogen at 10 atm, gaseous evolution data for carbon-13 reactions, and gaseous evolution data for air reactions are also presented. Kinetic parameters are given for oxidation reactions and hydrogasifications.

37999

APTIC NO. 61530

Yano, Takeo and Kei Miyayami

STUDIES ON THE ELIMINATION OF BAD ODORS. 6. THE TREATMENT OF WASTE WATER IN THE DEODORIZATION TREATMENT. (Akushu jokyo ni kansuru kenkyu. 6. Dasshu puroseshi ni okeru haisui no shori). Text in Japanese. Osaka-fu Taiki Osen Boshu Gijutsu Shiryo (Data Prevent. Air Pollut. Osaka Prefect.), no. 9:68-75, April 1973. 3 refs.

Various methods of odor elimination are accompanied by the formation of waste water. These methods are the combustion method, in which water is used for the washing of the exhaust gas, the cleaning method, which is accompanied by the discharge of absorption solution, and the electrode method, which discharges absorption liquid. The basic processes of treatment of these waste solutions are precipitation, biological

oxidation, physical separation such as filtration and floating up, and chemical treatment such as neutralization and the adjustment of pH. Neutralization is performed usually with sodium hydroxide or lime for acidic solutions and with sulfuric acid or hydrochloric acid for alkaline solutions. The adjustment of pH with acids or alkalis is necessary not only by neutralization but also by the adjustment of pH for biological treatment to aid the multiplication of active sludge. For flocculation or coagulation, aluminum sulfate, lime, iron salts, and polymer coagulating agents are used. Separation of sludge and water is also an important process. For this separation, a vacuum filter, centrifuge, and pressure filters are used. For the separation of oils from aqueous solutions, separation by gravity has been widely used. Recently, agents which accelerate the coagulation of fine droplets of oils and aid the formation of coarse drops, have been developed.

38000

APTIC NO. 56923

Yoshida, Tetsuo

TENDENCY OF DUST COLLECTION TECHNIQUES. (Shujin gijutsu no doko). Text in Japanese. Kanyo Gijutsu (Environ. Conserv. Eng.), 2(11):783-794, Nov. 1973.

Popular dust control techniques are reviewed. Cyclones are inexpensive, efficient for particle sizes of more than 5 micron, and have no mechanical parts. Future trends are to improve efficiency of particle size collection for dusts of less than 5 micron and the use of multi-stage cyclones to handle great quantities of dust. The trend in bag filter equipment is toward non-woven materials because the speed of filtration and abrasion resistance is 2-3 times that of the conventional woven fabrics. Electrostatic precipitators and scrubbers are also discussed.

38001

APTIC NO. 61406

Yu, Shinichi

PERFORMANCE OF CYCLONE DUST COLLECTOR AND ITS PROGRESS. (Saikuron shujinki no seino to sono shinpo). Text in Japanese. Kanyo Gijutsu (Environ. Conserv. Eng.), 2(11):814-819, Nov. 1973. 31 refs.

Pressure loss, consumption of power, and dust separating efficiency are the most important factors in the performance of a cyclone. Dust collecting efficiency was not affected up to a dust concentration of about 30 g/cu m, if the diameter of cylinder was doubled. The dust collecting efficiency was lowered by about 1 to 2%, when the outlet pipe was not inserted into cyclone. In the case of high wind velocity (12 m/sec), the efficiency reached a maximum near the center of the inlet pipe. The best value for the velocity of the wind at the inlet was about 10 to 15 m/sec. Trends are toward miniaturization of the cyclone and serial arrangements of multicyclones. Although the smaller the cyclone, the better the dust collecting efficiency taking into account the required power and amount of gas to be treated, the miniaturization of cyclone is not always recommended. The multicyclone seems to gain the position of precollector in the future because the limit particle size for the cyclone is 5 to 100 micron.

38002

APTIC NO. 58697

North Atlantic Treaty Organization, Committee on the Challenges of Modern Society, Expert Panel for Air Pollution Control Technology and Research Triangle Inst., Research Triangle Park N. C.

AIR POLLUTION. CONTROL TECHNIQUES FOR PARTICULATE AIR POLLUTANTS. N. 13. (FINAL REPORT). 218p., Oct. 1973. 240 refs.

GPO

A compendium of information on methods for the control of particulate air pollutants has been assembled based on the Environmental Protection Agency's Control Techniques for Particulate Air Pollutants. Particulate sources considered include: gasoline and diesel engines; gray iron foundries; petroleum

refineries; portland cement mines and factories; kraft pulp mills; asphalt batching plants; acid manufacturing plants; coke manufacturing ovens; primary smelting and secondary recovery facilities for copper, lead, zinc, and aluminum; soap and synthetic plants; glass furnaces and glass fiber facilities; carbon black installations; gypsum processing plants; coffee processing plants; cotton ginning plants; construction and demolition activities; and solid waste disposal. Control techniques described include: settling chambers, dry centrifugal collectors, wet collectors and mist eliminators, high- and low-voltage electrostatic precipitators, fabric filters, and afterburners. Emission factors are also provided for particulate sources.

38003

APTIC NO. 60687

Tennessee Valley Authority, Chattanooga, Tenn.

FULL-SCALE DESULFURIZATION OF STACK GAS BY DRY LIMESTONE INJECTION. VOLUME III - APPENDICES I THROUGH L. (FINAL REPORT). Environmental Protection Agency Interagency Agreement TV-30541A, Rept. EPA-650/2-73-019-c, 232p., Aug. 1973. 57 refs. PB 130385/AS

A series of appendices covering limestone factors affecting desulfurization of stack gases by dry limestone injection, mathematical modeling of the limestone injection process, utilization of limestone-modified fly ash, and process economics are provided as part of a report on results of a test program of dry limestone injection as demonstrated on a 150 MW pulverized-coal-fired boiler at the Tennessee Valley Authority's Shawnee Plant. Abstracted results are also given for individual Environmental Protection Agency support projects. Dry limestone injection does not appear capable of playing an important role in controlling sulfur dioxide emissions from power plants due to low removal efficiencies and the potential for major reliability problems.

38004

APTIC NO. 60753

Tennessee Valley Authority, Chattanooga, Tenn.

FULL-SCALE DESULFURIZATION OF STACK GAS BY DRY LIMESTONE INJECTION. VOLUME II - APPENDICES A THROUGH H. (FINAL REPORT). Environmental Protection Agency Interagency Agreement TV-30541A, Rept. EPA-650/2-73-019-b, 333p., Aug. 1973. 17 refs.

NTIS: PB 230384/AS

Appendices are provided for a report giving the results of a test program of dry limestone injection, demonstrated on a 150 MW pulverized-coal-fired boiler at the Tennessee Valley Authority's Shawnee Power Plant for the removal of sulfur dioxide from stack gas. Items covered include: statistics on the boiler and limestone system; development of a water-cooled probe; testing, sampling, and analytical procedures; computer printouts for Phase I tests involving equipment shakedown tests; instantaneous dust distribution studies; limestone injection effects on the solids collection system; limestone injection effects on disposal water quality; and additional heat requirement calculations. Dry limestone injection does not appear capable of playing an important role in SO₂ control at power plants due to low removal efficiencies and the potential for major reliability problems.

38005

APTIC NO. 60854

CLEAN AIR MAINTENANCE. (Die Reinhaltung der Luft). Text in German. Bull. Eidgenöss. Gesundheitsamtes, Beilage B, no. 6:346-359, Dec. 1973.

General problems and possibilities of clean air maintenance in the areas of domestic heating, industry, and automobile traffic are described. The air should be maintained as clean as possible, depending on technical and economic possibilities. The guidelines adopted for Switzerland stipulate that the pollution

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levels as measured in 1970 should not be exceeded, and that above-average pollution levels as occur locally should be reduced to at least the limit values. Also, all adequate measures should be taken to minimize specific emissions of fluorine, lead, malodorous substances, and other pollutants as emitted by certain industries. Domestic and industrial heating-generated emissions can be abated by decreasing the fuel consumption and the fuel sulfur content, by switching other, less polluting energy carriers, by improved combustion conditions, and by improved heat utilization, including improved heat insulation. The sulfur content in domestic fuel oils, now 0.5%, can be further reduced. Motor vehicle emissions (carbon monoxide, nitrogen oxides, hydrocarbons, and lead compounds) can be abated individually, but an overall reduction of all these emissions is hardly possible. Improved combustion conditions by adequate adjustment of the engine and the fuel dosing system, by new engine design, fuel injection, the use of stratified charge, partial exhaust recirculation, and conditionally by thermal and catalytic afterburning are available for emission abatement. The removal of lead from gasoline would require vast investments.

38006

APTIC NO. 60861

Office of Air Quality Planning and Standards, Research Triangle Park, N. C., Emission Standards and Engineering Div.

FLUE GAS DESULFURIZATION: ANSWERS TO BASIC QUESTIONS. Environmental Protection Agency 450/9-73-001, 16p., Oct. 1973. 1 ref.

NTIS: PB 231 005/AS

Flue gas desulfurization is discussed and questions raised throughout the country concerning its applicability, cost, effectiveness, and operation are answered. With the Clean Air Act of 1970, limits for sulfur dioxide emissions from fuel burning sources become more widespread as state plans were adopted to achieve national ambient air quality standards. At the Federal level, new source performance standards were enacted to limit SO₂ emissions from new steam generators of power plant size. Because of shortages of natural gas and of low-sulfur coal and oil, these limitations cannot be met solely by switching to low S fuels. Coal with a medium to high S content will have to be burned in increasing quantities by power plants to meet growth requirements and to safeguard an adequate supply of clean fuels for residential, commercial, and industrial use. In the next 10 yr, the principal alternative to the combustion of low S fuels will be the use of flue gas desulfurization (FGD) systems. Such systems can be used in conjunction with all types of fuels, but they are particularly appropriate for cleaning gases from the combustion of medium to high S coals, which constitute the largest segment of the nation's fuel reserves. A recent opinion of the U. S. Court of Appeals, however, upheld EPA's new source performance standard for coal-fired steam generators of power plant size. In so doing, the Court found that FGD technology has been adequately demonstrated and that the promulgated standards are achievable.

38007

APTIC NO. 61206

AIR AND WATER POLLUTION. (Inquinamento atmosferico e delle acque). Text in Italian. Riv. Combust., 27(10):490-498, Oct. 1973.

The state of the art of air pollution control in the Fos l Etang de Berre industrial area in France and in the USA, and a method for the calculation of the excess air from the oxygen content in the flue gas and the hydrogen to carbon ratio of the hydrocarbon fuel, are outlined. The acid pollution level in the Fos l Etang de Berre industrial area in France, as measured in 1972, was comparable to the 1971 level. Urban air pollution will be curbed by the assignment of special protection zones in which only low-sulfur fuel will be permitted. The U. S. Environmental Protection Agency proposed reduction of the

dust, hydrocarbon, carbon monoxide, and hydrogen sulfide emissions from petroleum refineries by 93%, 99.5%, and 99%, respectively. The dust emissions from waste incinerators should be abated by 96.6-99.6%. A method for the calculation of the excess air as a function of the oxygen content in the flue gas and of the hydrogen to carbon ratio of the fuel burned is described, and the results of calculations are presented in charts.

38008

APTIC NO. 61444

Electric Engineering Assoc. (Japan), and Research Association Heavy Oil Treatment Research Assoc. (Japan)

REPORT OF THE RESULTS OF INVESTIGATION ON THE TREATMENT OF HEAVY OILS. (Jushitsuyu shori gijutsu chosa hokoku). Text in Japanese. Nenryo Kyokaiishi (J. Fuel Soc. Japan) (Tokyo), 52(559):856-874, Nov. 1973.

Heavy oil desulfurization can be accomplished by flexicoking, gasification, thermal decomposition, hydrogenation, and oxidation. Sulfur contents can be reduced to 0.1%-0.04%, and the yields of the products were about 70-80%.

38009

APTIC NO. 61505

Schweizerische Gesellschaft fuer Umweltschutz

CATALOGUE OF MEASURES TRAFFIC AND RESIDENCE FOR THE PRESERVATION OF ENVIRONMENTAL QUALITY. (Massnahmenkatalog Verkehr und Siedlung zur Erhaltung der Umweltqualitaet). Text in German. Schweiz. Bauzeitg., 91(50):1220-1224, 1973.

A number of measures are listed as suitable for improving the environmental quality. The 42 listed measures are primarily concerned with traffic. They aim at reducing traffic density by suggesting a mixture of residential sections with working places. Commuter traffic can be avoided if the homes are close to the working places. Another measure suggests the substitution of personal appearances in business life by telecommunication. Residential sections should be increased to a density which makes the operation of public transportation worthwhile. Car pools, a traffic ban on Sundays and holidays, a reduction of the number of chartered flights, high taxation of the second car, more stringent regulations concerning exhaust gas contamination, speed limits, and planned reduction of highway construction are all measures aiming at the reduction of air pollution.

38010

APTIC NO. 61509

Chugoku Electric Power Co., Inc.

ELECTRIC POWER COMPANIES WRESTLING WITH ENVIRONMENTAL PROTECTION -- PRESENT STATE AND COUNTERMEASURES. (Knakyo hozen ni torikumu denryoku kakusha -- genjo to taisaku). Text in Japanese. Denryoku Kyokai Zasshi (J. Japan. Elec. Assoc.), 602(12):8-21, Dec. 1973.

The control programs of Japanese electric power companies to reduce dust, sulfur dioxide, and nitrogen oxide emissions are reviewed. Methods are described for desulfurizing fuels, direct combustion of crude oil, and desulfurizing flue gas by the lime-gypsum method. Two-stage combustion and recirculation are being studied for reducing NOx emissions. Boiler dust can be removed by electrostatic precipitation. Efficiency can be enhanced by ammonia injection into the electrostatic dust precipitator. The collected dust can be burned in incinerators.

38011

APTIC NO. 61546

SHELL PROCESS FOR CLEANING CLAUS WASTE GASES. (Shell-Verfahren zur Reinigung von Claus-Abgasen). Text in German. Chem.-Ingr.-Tech., 45(24):A1875-A1879, 1973. 2 refs.

The sulfur concentration in Claus waste gases is relatively high and the gases are free of dust which makes this desulfurization easier than that of flue gases. In the first process step of the Shell desulfurization of Claus waste gases the various sulfur compounds such as hydrogen sulfide, sulfur dioxide, sulfur, carbonyl sulfide, and carbon disulfide are converted to H2S under normal pressure. Sulfur dioxide and elemental sulfur are reduced by hydrogen or carbon monoxide in presence of a cobalt plus molybdenum/alumina catalyst at 300 C. In presence of water vapor CO is the preferable reducing agent. The hot waste gas is cooled to 40 C in a waste heat boiler and in a cooling tower by countercurrent flow of water. The cooled gas is scrubbed with an aqueous solution of alkanolamine through which the H2S is removed to a residual concentration of 300 vol ppm. The remaining concentration is converted to SO2 in an afterburner. Alkanolamine diisopropanolamine is mostly preferred because H2S is removed almost entirely and carbon dioxide is absorbed to between 20 and 30 percent. With this process a sulfur recovery of 99.8 percent is feasible. Several commercial plants are under construction. Two plants have been in operation since July 1973.

1972

38012

APTIC NO. 56714

Archer, D. H., E. J. Virdt, D. L. Kearns, J. P. Morris, and J. L. Chen

COAL GASIFICATION FOR CLEAN POWER PRODUCTION. Preprint, Westinghouse Research Lab., Pittsburgh, Pa., 44p., 1972. 29 refs. (Presented at the International Conference on Fluidized Bed Combustion, Hueston Woods, Ohio, Oct. 29-Nov. 1, 1972.)

A proposed improved multistage fluidized bed coal gasification process for power production process is described and illustrated. It comprises three process units, a dryer, recirculating bed devolatilizer-desulfurizer, and fluidized bed gasifier-combustor. The plant is expected to be lower in capital costs, lower in pollutants emissions, but equal in overall efficiency to a conventional power plant. The process uses air and steam for gasification and limestone or dolomite sorbents for desulfurization. A development effort is underway which includes the construction of a 1200 lb/hr coal gasifier and the performance of a supporting laboratory program. (Author abstract modified)

38013

APTIC NO. 60946

Armstrong, D.

LAND USE PLANNING-WORKSHOP 3. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 325-327. (Oct. 17-19.)

Land use models are considered in terms of likelihood of impact in land use decisions, justification of the cost of developing and applying such a model, and possible ways of increasing the cost effectiveness of a land use model. Currently, there is no available land use model whose greatest value would be in showing alternatives and impacts as opposed to optimizing land use. The cost of such a model is seen as justified if it can be related to the number of people involved and/or the value in dollars. Stating what the model will and will not do is proposed as the best way to increase the model's effectiveness. Selection of alternative transportation modes is a key element in land use planning, but there is no accepted methodology for analyzing available tradeoffs between various environmental nuisances resulting from different strategies. Questions concerning the general characteristics, structure, and application of land use models are presented for consideration.

38014

APTIC NO. 60933

Breidenbach, A. W.

THE DEVELOPMENT OF TECHNOLOGY FOR ENVIRONMENTAL CONTROL. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf. Environ., Livermore, Calif., 1972, CONF 721002, p. 52-68, 69-70. (Oct. 17-19.)

The status of the Environmental Protection Agency program on technology for environmental control and the estimated fiscal year 1973 research budget is discussed for municipal wastes, industrial wastes, combined sewer overflow, oil and hazardous materials, mine drainage, water supply, solid waste, air pollution, and noise. Air pollution research to develop control technology for stationary sources to meet ambient air quality standards has been allocated approximately \$80,000,000 over the past 5 years. The estimated fiscal year 1973 budget allocates \$18,700,000 for sulfur oxides control, \$4,500,000 for nitrogen oxides control, \$2,700,000 for particulate control, and \$1,800,000 for the control of other hazardous pollutants. The research effort has been aimed primarily at developing and demonstrating clean, i.e., low-sulfur, fuels, new and modified combustion and combustion-related processes, flue gas cleaning, and certain supportive studies. The efforts to develop clean fuels include mechanical coal cleaning, chemical coal cleaning, and coal gasification research. Combustion process modifications directly affect nitrogen oxides emissions, e.g., combustion with excess air, recirculation of the flue gas in the fuel-gas mixture, multi-stage combustion, and fluidized bed combustion. Process modification has also extended into such non-combustion industrial areas as nitric acid, smelting, and coke plants. Processes for cleaning various gases, particularly the effectiveness of dry limestone injection, limestone wet scrubbing, catalytic oxidation, and magnesium oxide processes are being studied. Studies on qualitative and quantitative analysis, the effects of particulates on man, and pollutant modification of tropospheric phenomena will have to be intensified.

38015

APTIC NO. 60916

Brewer, Gerald Ledon

GAS AFTERBURNERS. (Nachverbrennungsanlage fuer Gase). Text in German. (Universal Oil Products Co., Des Plaines, Ill.) W. Ger. Pat. 2,164,122. 4p., July 13, 1972. 3 refs. (5 claims).

An afterburner for the destruction of exhaust air from lacquered wire drying ovens is described. The exhaust air, preheated by the waste heat of the exhaust air, is admitted into the afterburner chamber, and is forced through the afterburner chamber in a flue whose individual baffle loops are spacers forming gas guide elements to an outlet. Preferably the duct is tubular. The gas/air inlet is at 90 deg to the exhaust duct.

38016

APTIC NO. 60011

Buonomo, Franco, Vittorio Fattore, Gianfranco Zannoni, and Bruno Notari

CATALYST FORMULATIONS SUITABLE FOR THE OXIDATION OF CARBON MONOXIDE AND HYDROCARBONS, AND ESPECIALLY OF INTERNAL COMBUSTION ENGINE EXHAUST GASES. (Zur Oxidation von Kohlenmonoxid und Kohlenwasserstoffen, insbesondere von Brennkraftmaschinenabgasen verwendbare Katalysatorzusammensetzungen). Text in German. (Snam Progetti S.p.A., Milan (Italy)) W. Ger. Pat. Appl. 2,243,019. 6p., Sept. 1, 1972. (30 claims).

Catalyst formulations and their preparation for the oxidative and reductive destruction of carbon monoxide and hydrocarbons, especially in automotive exhaust gases, are described. The catalyst formulations constitute ternary mixtures of the oxides of chromium, copper and nickel, of chromium, copper, and manganese, or of cobalt, manganese, and copper, applied on spherical or spheroidal particles of gamma-aluminum oxide with a porosity of 0.5-1 cu cm/g, a specific surface of 150-350

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sq m/g, and high mechanical strength. The support particles are impregnated with chromium oxide and with the oxides of cobalt and/or copper by using the aqueous solution of their acetates of nitrates, after which the preimpregnated particles are dried and calcined in a temperature range of 500-800 C. Then, the calcined particles are impregnated with an aqueous solution containing the acetates or nitrates of all catalytic metals for subsequent drying at 80-120 C and calcination at 500-800 C. The catalyst or combination of the different catalyst formulations are placed in a catalytic reactor subdivided into chambers and into two zones with oxidizing and reducing atmospheres in the exhaust chamber. Oxidizing atmosphere is generated by the admission of air into the oxidizing zone of the catalytic reactor.

38017

APTIC NO. 60010

Coutry, Philippe, Andre Sugier, Bernard Raynal, and Georges Berrebi

CATALYSTS FOR DECOMPOSING NITROGEN OXIDES, ESPECIALLY IN AUTOMOBILE EXHAUSTS. (Verfahren zur Zersetzung von Stickstoffoxiden und zu dem Zweck verwendete Katalysatoren). Text in German. (Societe Francaise des Produits pour Catalyse, Rueil-Malmaison (France)) W. Ger. Pat. Appl. 2,218,665. 42p., April 18, 1972. (16 claims).

A catalyst is described for decomposing nitrogen oxides in stack and automobile exhaust gases. It contains a carrier such as aluminum with the addition of 10 wt% magnesium, cadmium, barium, or lithium oxide and small amounts of alumina and/or aluminum silicate, with a specific surface area of less than 100 sq m/g. An active phase (3-20 or 6-15 wt% of catalyst) containing a nickel, iron, and chromium compound is coated on this carrier. The carrier's composition amounts to $\text{Ni sub } x (\text{Fe sub } y \text{ Cr sub } z) \text{ O sub } t$, where x equals a valence of 0.85-1.30, $y + z$ equals a valence of 1.8-2.3, $y: (y + z)$ equal a valence of 0.02:1-0.6:1, and t equals 2-6. At least 50% of the nickel atoms may be replaced by magnesium, cadmium, manganese, copper, zinc, cobalt, or iron; at least 50% of the total Fe and Cr atoms may be replaced by Al, Mn, vanadium, scandium, yttrium, or elements of atm 57-71. The catalyst may also contain 10-10,000 parts by weight of ruthenium, rhodium, palladium, osmium, iridium, or platinum/10 to the 6th power parts by weight. The carrier may be coated with the active phase by impregnating it with an aqueous solution with the addition of at least one complexing compound (polycarboxylic acid, carboxylic acid, or polyalcohol) and/or with one gelatinizing agent (gum, alkyl cellulose, propylene oxide, polypropylene oxide, or polyethylene oxide). After impregnation, the carrier is dried at temperature between 80 and 250 deg and then activated by heating to 500-800 deg for 30 min in the presence of air, nitrogen, oxygen, hydrogen, or a N/H mixture.

38018

APTIC NO. 60936

Croke, K. G., A. S. Kennedy, and T. E. Baldwin

RESEARCH PROBLEMS AND ISSUES IN THE APPLICATION OF LAND USE CONTROLS TO ENVIRONMENTAL PROTECTION. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 153-157. 13 refs. (Oct. 17-19.)

Past preliminary results, present investigations, and future research needs are reviewed for the application of land use controls to environmental protection, particularly air pollution control. Preliminary research efforts on environmental/land use planning interface indicate the following: no methods for systematically assessing the environmental impacts of land use and transportation decisions on a routine basis exist yet; successful linkage of traditional land use planning and transportation models with the emission, transport, and dispersion models now used by environmental protection agencies is not conclusively demonstrated; and the tendency of certain economic units to cluster for reasons of locational advantage

still endangers local air quality. Present environmental/land use research by the Argonne National Laboratory includes the following: investigation of alternative classification schemes through which the air pollution potential of various standard land uses can be predicted and ranked; evaluation of the effectiveness of various environmental transportation system control policies; and application of air quality. Future research requirements outlined are: the need for a land use/environmental taxonomy which reflects the emission potential and pollution assimilation capacity of alternative industrial, residential, and commercial land uses; communication of environmental assessment techniques to land use planning groups; and the assessment of the economic impacts of policies that restrict or alter land use patterns within urban areas.

38019

APTIC NO. 60712

Donath, Ernest E.

PROCESS FOR THE GASIFICATION OF CARBON-CONTAINING MATERIALS. (Verfahren zur Vergasung von kohlenstoffhaltigen Materialien). Text in German. (Bituminous Coal Research, Inc., Monroeville, Pa.) W. Ger. Pat. Appl. 2,245,735. 25p., Sept. 18, 1972. (9 claims).

A two-stage process for the gasification and desulfurization of coal is described. The char from the second gasification zone is returned to the first gasification zone and contacted with superheated water vapor and oxygen, whereby the returned char is practically completely gasified, and a synthesis gas, composed of carbon oxides and hydrogen, is obtained. Fresh coal is contacted in the second gasification zone with superheated water vapor and synthesis gas from the first gasification zone for the partial gasification of the coal. Gas and entrained char particles are tapped, particles are separated, and part of the char is removed for being burned off to obtain the necessary energy for the gasification process. Both gasification zones are operated at a temperature of at least 1400 C and at least 925 C, and under a pressure of 72 atm. The water vapor temperatures in the first and second gasification zones are 425 C and 480 C. Prior to combustion, the char removed from the reaction zone is treated with the gas from the second gasification zone that contains hydrogen and carbon monoxide at a ratio of 3.05:1, for further reduction of the sulfur content. Hydrogen sulfide and carbon dioxide are removed from the gas, and H₂S is reduced to elemental sulfur. The gas is then contacted with a catalyst, and a synthesis gas containing at least 90% methane is obtained.

38020

APTIC NO. 61081

Finney, C. S.

CONVERTING WASTES TO MARKETABLE PRODUCTS: TREATING THE ECONOMICS AS A VENTURE CAPITAL CONCEPT. Preprint, 13p., 1972. (Presented at the International Pollution, Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972.)

U. S. energy utilization patterns and sources for 1971 and 1985 are shown. During the next 20 years the annual consumption of oil and gas for power generation will increase by 180% and 110%, respectively. Respective increases in the use of liquid and gaseous fuels for all purposes are 90% and 70%. A flash pyrolysis process that produces oil or gas from municipal refuse, animal wastes, agricultural wastes, and tree bark could alleviate the projected energy shortage. If applied to all solid wastes, energy equivalent to 1.6 billion barrels of oil/yr could be recovered. The process is scheduled to be operated in a 200 ton/day demonstration plant in San Diego County. The opportunities for commercialization appear excellent for 2000 ton/day units serving communities of 800,000.

38021

APTIC NO. 60829

Greeley, Richard S.

INTERNATIONAL ENVIRONMENTAL ISSUES. Mitre Corp., Washington Operations, Symp. Energy, Resour. Environ., Proc. Arc-et-Sanans, France, 1972, p. 282-321. (May 12-14.)

Several environmental issues are reviewed -- the greenhouse effect caused by carbon dioxide; pollution of the ocean; nuclear power plants which cause waste heat, air pollution, and radioactivity; the siting of power plants and industrial facilities; strip mining; off-shore exploration and production of oil and other minerals; and the exploitation of resources in wilderness and remote areas. Sulfur dioxide is one of the major air pollution problems caused by coal and oil burning. The use of low-sulfur fuels, fuel desulfurization, gasification of coal, and removal of SO₂ from stack gases are the major control methods. Automobiles are the other main source of air pollution. The Clean Air Act requires the reduction of pollution from cars. Control methods include stratified charge engines, Wankel engines, electric vehicles, steam engines, Stirling engines, and other alternative power plants. Radioactivity is also discussed.

38022

APTIC NO. 60668

Haseba, Shigeru

PROCESS FOR THE REMOVAL OF HARMFUL COMPONENTS FROM WASTE GASES. (Verfahren zur Entfernung schädlicher Komponenten aus Abgasen). Text in German. (Kobe Steel Ltd., Kobe (Japan)) W. Ger. Pat. Appl. 2,242,588. 16p., Aug. 30, 1972. (8 claims).

A process for the catalytic removal of harmful gas components such as carbon monoxide, nitrogen oxides, and hydrocarbons from waste gases, especially from automobile exhaust gas, is described. The exhaust gases are mixed with oxygen or air, led through a catalyst bed for the oxidation of hydrogen, through another catalyst bed for the reduction of nitrogen oxides, and, mixed with oxygen or air again, through a third catalyst bed for the oxidation of carbon monoxide and hydrocarbons. The heat produced in the hydrogen-oxidizing catalyst bed is transferred into the nitrogen oxide-reducing catalyst bed. The hydrogen-oxidizing catalyst, platinum, provokes oxidation of hydrogen at a temperature range of 50-300 C without reducing nitrogen oxides. Palladium, nickel, or copper chromite are used as catalysts for the reduction of nitrogen oxides, and for the oxidation of CO and hydrocarbons. The efficiency of the catalytic process in the removal of nitrogen oxides ranges from 40.3% to 94.8%, efficiency for CO removal is 95.8-97.8%, and HC removal efficiency is 90-94%.

38023

APTIC NO. 60871

Haynes, C. D. and R. Lindsay

COMPARATIVE STUDY OF METHODS OF REDUCING EXHAUST EMISSIONS TO VERY LOW LEVELS. Preprint, British Leyland Motor Corp. Ltd., London (England), 10p., 1972 (?). 12 refs.

Comparative studies of automobile emission control methods for reducing hydrocarbons, carbon monoxide, and nitrogen oxides were performed by British Leyland Motor Corporation Limited and Shell on the following systems: exhaust gas recirculation with thermal oxidation; exhaust gas recirculation/catalytic oxidation; lean air-fuel ratio with exhaust gas recirculation and thermal reactor; ultra-rich air-fuel ratio/thermal (catalytic) oxidation; dual catalyst - catalytic reduction/oxidation (with or without exhaust gas recirculation); single catalyst - catalytic reduction/oxidation; and ultra-lean air-fuel ratio/catalytic hydrocarbon oxidation. The best prospect for application to 1976 United States legislation requirements appeared to be the all-catalyst system which was capable, at low mileage on research vehicles, of giving results below the numerical values required. Very lean mixtures appeared worthy of investigation as a very long-term prospect, while systems relying entirely or almost entirely on exhaust gas recirculation for nitrogen oxide control appeared adequate for the intermediate (1975) phase of NO_x legislation but appeared unlikely to achieve the necessary performance levels required beyond 1975. The need for accurate control of mixture strength with the best possible mixture preparation and distribution was found paramount regardless of the emission control system and the chosen mixture strength regime for the control system.

38024

Hebden, D. and G. Percival

NEW HORIZONS FOR PRESSURE GASIFICATION. THE PRODUCTION OF CLEAN ENERGY. Inst. Gas Eng. J. (London), 12(8):229-244, Aug. 1972.

Pressure gasification processes are reviewed in relation to their application and energy source, costs, and production of clean energy. The processes include coal hydrogenation, catalytic methane synthesis, fluid-bed hydrogenation, gas recycle hydrogenation, and catalytic-rich gas; and all are designed to operate at high pressure which thermodynamically favors the formation of methane, facilitates the removal of sulfur and carbon dioxide, and minimizes capital expenses. The first two are concerned with the gasification of coal, while fluid-bed hydrogenation is applicable for crude and heavy oils. Gas recycle hydrogenation can be applied for medium oils and heavy naphtha, and catalytic rich gas for light naphtha and liquefied petroleum gases. All the processes have the common objective of the production of methane. Approximate capital costs of synthetic natural gas plants are plotted against the feedstock spectrum. The low capital cost of the naphtha-based SNG plant compensates for the relatively high-price feedstock; while, on the other hand, the cost of coal must be low to compensate for the high capital cost of a coal-based SNG plant.

38025

Hietbrink, E. H., J. McBrean, S. M. Selis, S. B. Tricklebank, and R. R. Witherspoon

ELECTROCHEMICAL POWER SOURCES FOR VEHICLE PROPULSION. In: *Electrochemistry of Cleaner Environments*. John O. M. Bockris (ed.). New York, Plenum Press, 1972, Chapt. 3, p. 47-97, 101 refs.

Batteries and fuel cells in the research and development stage and in the refinement stage are discussed in relation to possible vehicle use. Presently, deficiencies in either power or energy densities of available systems limit their use in electric vehicles. The fact that most of the power in a vehicle power plant is for acceleration and gradeability and that only about 30-50% of this power is required for constant cruise speed suggests the possibility of a hybrid vehicle with a heat engine coupled with a battery system for providing additional power when needed. The lead-acid battery has sufficient power density for this type of application; however, its relatively poor energy density would provide only a very short range in an all-electric mode of operation. The development of an energy battery such as a rechargeable zinc-air battery or an organic electrolyte system could lead to the replacement of the heat engine. Fuel cells could be used in conjunction with a power battery in a hybrid mode. The only battery that appears capable of meeting the requirements of a single electrochemical power source is the high-temperature, molten salt type; basic research, however, is needed to overcome problems associated with high operating temperatures and extremely energetic reactants. The other possibility for a single power source system is the fuel cell. An increase in power density, both in terms of weight and volume, will be necessary before this becomes a reality. The pollution control effectiveness of electric vehicles would be greater, relative to the combustion engine vehicles, since responsibility of controlling pollutants would be delegated to the utility industry; it would seem more practical, economical, and efficient to control pollutants from a relatively small number of large stationary combustion units as compared to millions of small, mobile combustion engines.

38026

Hirschberg, Eugene Howard, Garbis Hagop Meguerian, and Frederick William Rakowak

CATALYST AND PROCESS FOR THE REDUCTION OF NITROGEN OXIDES. (Katalysator und Verfahren zur Reduktion von Stickoxygen). Text in German. (Standard Oil Co., Chicago, Ill.) W. Ger. Pat. Appl. 2,242,183. 17p., Aug. 28, 1972. (18 claims).

86

APTIC NO. 60652

AIR POLLUTION ABSTRACTS, AUGUST 1974

A catalyst and process for the reduction of nitrogen oxides in automobile exhaust gases, which also contain carbon monoxide and hydrocarbons, are described. The nitrogen oxides are reduced without ammonia formation in a temperature range of about 260-316 C and at space velocities of 15,000 to 35,000. The catalyst, applied on an inorganic support made of alumina, silica-alumina, bauxite, zirconium oxide, magnesia-alumina-silica, or zinc oxide-alumina, is composed of 20 to 60% nickel oxide, 5 to 15% copper oxide, 1 to 20% iron oxide, 5 to 8% chromium oxide, 0.5 to 2% barium oxide, and one metal of the platinum series.

38027

Huppke, P. Glen and Robert L. McIlvaine

PROCESS AND DEVICE FOR THE CLEANING OF POLLUTED GASES. (Verfahren und Einrichtung zum Reinigen von verschmutztem Gas). Text in German. (Enviroceering, Inc., Skokie, Ill.) W. Ger. Pat. Appl. 2,231,895. 21p., June 29, 1972. (20 claims).

A process and device for the removal of gaseous and particulate pollutants from waste gases are described. The waste gases to be cleaned, admitted at the bottom of the device, penetrate through the holes of a perforated slanting plate over which there is a constant slow flow of a thin layer of wash liquid to which a foaming agent was added. The excess wash liquid is drained off through the holes of the perforated plate, and the gaseous and particulate pollutants are taken up and entrained by the foam bubbles that ascend to a series of slightly slanting plates from which the residual wash liquid is drained off. Finally, the foam bubbles are destroyed by a froth breaker.

38028

Isahaya, Fumio

PROCESS AND DEVICE FOR THE PURIFICATION OF WASTE GASES CONTAINING HARMFUL SUBSTANCES. (Verfahren und Vorrichtung zur Reinigung von schädlichen Substanzen enthaltendem Abgas). Text in German. (Hitachi, Ltd., Tokyo (Japan)) W. Ger. Pat. Appl. 2,238,801. 13p., Aug. 7, 1972. 5 refs. (6 claims).

A process and device for the absorptive removal of harmful components, such as sulfur dioxide and nitrogen dioxide, from waste gases are described. The waste gas to be purified is treated with an absorbent solution for the absorption of the harmful components, after which the absorbent solution is treated with one or more reagents in a reactor for the conversion of harmful substances into harmless ones. Then, part of the absorbent solution containing the now harmless substances is lead into a second contact apparatus, designed as a spray drier, where it is dried directly by the hot waste gases under the formation of solid substances, while the waste gas to be purified are cooled. The rate of absorbent admission into the spray drier is controlled as a function of the waste gas flow rate in the spray drier and of the difference between the gas inlet and the gas outlet of the spray drier.

38029

Kerner, Walter

PROCESS FOR SULFURIC ACID PRODUCTION. (Verfahren zur Herstellung von Schwefelsäure). Text in German. (Chemiebau Dr. A. Zieren GmbH and Co. KG, Koeln (West Germany)) W. Ger. Pat. Appl. 2,208,393. 5p., Feb. 23, 1972. (6 claims).

A process for the production of sulfuric acid from waste gases containing 3.5 to 8% of sulfur dioxide by volume, and especially from flue gases of metallurgical furnaces, is described. Following multistage contact oxidation of SO₂, the sulfur trioxide formed is absorbed in two absorber towers placed before and behind the last contact stage each. Both the raw gas, and the gas from the first SO₃ absorber stage, are heated by the SO₃-containing gas. The first-stage SO₃ absorption is done by means of an absorption tower with a spray of sulfuric acid

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previously heated to 70-145 C. The sulfuric acid used for SO₃ absorption is cooled by 10 to 70 C for recirculation within the absorption process.

38030

APTIC NO. 60039

Kolar, J.

THE SIGNIFICANCE OF NATURAL GAS FOR CLEAN AIR MAINTENANCE IN CITIES. (Die Bedeutung des Erdgases fuer die Reinhaltung der Luft in Staedten). Text in German. Waerme, 78(1/2):11-21, 1972. 94 refs.

Studies on the environmental impact of the use of natural gas, and on air pollutants generated by natural gas during distribution and combustion are reviewed. Natural gas represents an ideal fuel because it generates the least air pollutants of all energy carriers, and it causes practically no secondary air pollution. While natural gas effectively helps abate air pollution especially in urban areas, it can not replace all other energy carriers due to its limited availability. Raw natural gas contains elemental sulfur, hydrogen sulfide, sulfanes, mercaptans, and carboxyl sulfide. Commercial natural gas contains 0.01 to 24 mg of H₂S per cu m, and total sulfur of 0.3-500 mg/cu m, as well as 8-10 mg of tetrahydrothiophene as an odor tracer. The limits imposed on the H₂S and organic sulfur contents in commercial natural gas are 5 mg/cu m and 150 mg/cu m, respectively. During its combustion, natural gas generated nitric oxide, nitrogen dioxide, oxides-sulfur oxides compounds, carbon monoxide, formaldehyde, soot, but practically no other solid residues. The nitrogen oxide emissions from small-capacity, medium-capacity, and large-capacity firing equipment are in the respective ranges of 1.7-150 g/GJ, 20-40 g/GJ, and 67-810 g/GJ. The CO emissions, ranging from 0.2 to 580 g/GJ in small-capacity firing equipment, can be abated by increasing the mean and local air excess coefficient. Gaseous hydrocarbons emissions of 0.35-9 g/GJ, aldehyde emissions of 0.08-48 g/GJ, organic acid emissions of 34 g/GJ, and 3,4-benzofluoranthene emissions of 0.00004-0.00014 g/GJ were detected.

38031

APTIC NO. 58662

Krueding, A. P.

RCD ISOMAX-PRODUCTION ROUTE TO TODAY'S AND TOMORROW'S LOW SULFUR RESIDUAL FUELS. Preprint, American Inst. of Chemical Engineers, New York, 33p., 1972. 9 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 71st, Dallas, Tex., Feb. 20-23, 1972.)

Unless present plans are altered, the impending energy crisis coupled with enactment and enforcement of increasingly stringent legislation regulating fuel oil sulfur content are expected to result in a serious imbalance in residual fuel oil demand versus availability beginning in the next few years and extending into the foreseeable future. Commercially proven hydrodesulfurization technology such as the UOP RCD Isomax process is presently available for production of residual fuel oils in the range of 1.0 wt% sulfur. Modification of existing techniques will permit, for most crude oils, production of heavy fuels meeting tomorrow's regulations. (Author summary)

38032

APTIC NO. 60662

Leikert, Klaus

EXAMPLES FOR THE INCINERATION OF RESIDUES IN THE CHEMICAL INDUSTRY. (Beispiele fuer die Verbrennung von Rueckstaenden der chemischen Industrie). Text in German. Waerme, 78(1/2):50-56, 1972.

Methods and equipment for the incineration of residues in the chemical industry are presented. In general, the waste water to be incinerated is admitted to the combustion chamber through a nozzle, heated to the ignition point of the combustible components, and incinerated, possibly under admission of auxiliary fuel, mostly natural gas or oil, for wastes with low calorific value. The flue gases are used for steam generation before

dust separation. The economy of such incinerators can be improved by partial or complete evaporation of the waste water by using the waste heat generated by the incinerator proper. Waste liquors with high-boiling components can be evaporated by means of direct-contact evaporators. Volatile components in waste liquids can be driven off by means of immersion heaters for subsequent thermal or catalytic incineration. An incineration process developed by OFAG-Steinmueller is suitable for the incineration of an aqueous solution of sodium salts of organic acids by means of hydrocarbon wastes and fuel oil for steam generation and soda recovery.

38033

APTIC NO. 60518

Moseley, Fred, John Aldwyn Lacey, Thomas Rawland Phillips, and Robert Leslie Ensell

PROCESS FOR THE PRODUCTION OF GASES. (Verfahren zur Herstellung von Gasen). Text in German. (Gas Council, London (Great Britain)) W. Ger. Pat. Appl. 2,238,501. 39p., Aug. 4, 1972. (13 claims).

A process for the production of a gas composed of methane and carbon dioxide from predominantly aliphatic petroleum distillates with a highest end point of 170 C by single-stage, catalytic gasification by means of water vapor is described. After removal of CO₂, the gas obtained can be used in place of natural gas. Ruthenium, cobalt, nickel or their mixtures, precipitated from their solutions, or 50-85% nickel with 50-15% silicic acid, or 20-50% ruthenium with 80-50% clay are used as catalysts in a static bed. The catalytic conversion takes place in a temperature range of 250-350 C with at least one of the reaction components in liquid phase for the control of the pressure and temperature necessary for the conversion. Part of the catalyst is wetted by water for the liquid-phase conversion, while another part of the catalyst, placed in a separate reactor for gaseous-phase conversion, is dry.

38034

APTIC NO. 60823

Nishida, Konosuke and Tsuneo Honda

THE TRIAL PRODUCTION OF MEASURING DEVICE FOR THE SENSORY ODOR. (Akushu ni taisuru renzoku sokutei sochi no shisaku). Text in Japanese. Kankyo Gijyutsu (Environ. Conserv. Eng.), 1(3):1-11, 1972. 32 refs.

For continuous measurement of odorous gases and sensory reactions to them measurement equipment was designed and constructed. It is called Psychro-Ofactometer, and comes in a stable large unit and a smaller, simplified unit, which will eventually be reduced to a portable unit. The system has a thermo-hygro bath, an automatic flow controller, an adjustment valve, a fresh air container, a bimetal switch, a compressor, a cooling coil, a dewcell hygrometer, an expansion valve, a fan, a pressure gauge, a flowmeter, a humidistat, a heating coil, an integrating meter, a motor valve, a mixture box, a mask, a needle valve, an air pump, a push marker, a pressure switch, a pressure tank, a pressure regulator, a 2-stage pressure regulator, a recorder, a solenoid valve, a thermostat, a test odor bag, and a twin timer. Preliminary to the test, odor material elements singly and in combination are measured to make a standard index table, under the constant temperature and humidity of 25 C, 60%, and dilution multiplications are prepared. The persons to be tested go into the box one by one and odor elements and fresh air are alternately supplied, in order not to fatigue the olfactory sense of the testee. The reaction of the testee is recorded continuously by a polygraph. The threshold of odor sensing is signaled by the pushmaker, and repeated tests can be given many times. Using the dilution multiplication table, the degree of unpleasantness and attenuation goals can be judged.

38035

APTIC NO. 58678

Noll, Kenneth E.

TRANSPORTATION AND AIR POLLUTION. Traffic Eng., 1972:12-17, 56-57, June 1972. 16 refs.

The automobile is a major source of hydrocarbons, nitrogen oxides, and carbon monoxide. The ultimate solution to motor vehicle air pollution will involve a combination of the following programs: better urban planning, rapid transit, improved control devices, consideration of the environmental impact of freeways, and traffic regulation and traffic flow to minimize pollution. These methods are described.

38034

APTIC NO. 60965

Novotny, Pavel

RESEARCH INTO THE FLUID-BED PROCESS AT THE FUEL RESEARCH INSTITUTE, BECHOVICE. (Vyzkum technologie fluidního spalování v UVP, Bechovice). Text in Czech. Ústav pro výzkum a využití Paliv, Prague (Czechoslovakia). Sb. Přednášek 50 (Padesátému) Vyroci Ústavu Vyzk. Využití Paliv, 1972, p. 104-111.

A two-step fluid-bed process for the combustion of low-rank coal was developed in the laboratory and scaled up to production level. The ash content of the coal may be as high as 75%. Slag formation is prevented if the combustion temperature does not exceed 1000 C. The temperature is controlled by regulating the amount of air used to fluidize the bed. The process uses a converted open-hearth furnace. Liquid fuels (e.g., oil residues and tars) and wastes from the chemical, pharmaceutical, and food-processing industries may also be burned. The waste flue gases can be desulfurized by the use of alkaline adsorbents. The maximum particle size of the ash produced by the fluid-bed technique is 30 times larger than in ash from nonfluidized beds (15 mm vs 0.5 mm). Since the settling rate is proportional to the weight of the particles, the fluid-bed approach is clearly preferable.

38037

APTIC NO. 58704

Ogasawara, Mitsunobu, Toshimi Takagi, and Kenichi Fujii

FUNDAMENTAL STUDIES ON NO AND CO FORMATIONS AND THEIR EVALUATION IN COMBUSTION SYSTEMS. Osaka Univ., Japan, Faculty of Engineering, Japanese Assoc. of Railway Industries Technical Memorandum No. 10, 16p., Dec. 1972, 12 refs.

Concentrations of combustion products, especially carbon monoxide and nitric oxide, which come from a propane-air premixed flat burner flame were measured along the gas stream down from the flame and the results were examined by chemical kinetic calculations. The effects of various factors affecting NO formation and the effectiveness of some emission control systems were examined by calculations of chemical equilibrium and kinetics. Raising the temperature greatly increases the equilibrium concentration and rate of formation of NO. At the same temperature, both the equilibrium concentration and rate of formation become larger for leaner air-fuel mixtures. High pressure results in a slightly lower equilibrium concentration but a higher rate of formation. Nitric oxide formation is little affected by the type of hydrocarbon fuel if the temperature is the same, but at each adiabatic flame temperature, it differs by the fuel. Reduction of NO formation by exhaust gas recirculation and water rejection systems is attributed to the lowering of temperature. Evaluation of their effectiveness must be made kinematically, because they are more effective than expected in equilibrium conditions. Two stage combustion becomes more effective when the temperature drop or heat loss in the primary combustion zone increases.

38038

APTIC NO. 60528

Pebler, Alfred and William M. Hickam

PROCESS AND DEVICE FOR THE MEASUREMENT OF THE FUEL AND OXYGEN CONTENTS IN GASES. (Verfahren und Vorrichtung zum Messen der Brennstoff- und Sauerstoffanteile eines Gases). Text in German. (Westinghouse Electric Corp., Pittsburgh, Pa.) W. Ger. Pat. Appl. 2,239,285, 15p., (Aug. 10, 1972, 5 claims).

A device and process for the measurement of the fuel and oxygen content in gases are described. The gas sample is divided into two flows and admitted into an incinerator in counterflow. The incinerator has a thermocouple with a catalytic surface exposed to one partial flow, and another noncatalytic surface exposed to the other partial flow. The combustion reaction takes place on the catalytic surface whereby either the oxygen or the fuel being present in a smaller proportion than the other component is quantitatively used up. The quantity of the component present in smaller proportion is indicated by a first electric signal, after which a second and third electric signals, indicating the excess of oxygen or fuel, respectively, in the reaction gas, are generated by a measuring unit. In case of excess oxygen in the reaction gas, an oxygen titrating unit is activated which supplies an electric signal indicating the amount of oxygen added. The signals are utilized for obtaining further electric signals that indicate the oxygen and fuel content in the original gas sample. Both the measuring unit and the oxygen titrating unit constitute solid electrolyte cells with high ion conductivity and negligible electron conductivity.

38039

APTIC NO. 60521

Ruff, Charles David and Jacques Pierre Sibaud

PROCESS AND DEVICE FOR THE REMOVAL OF HYDROGEN SULFIDE AND MERCAPTANS FROM LIQUIDS AND GASES. (Verfahren und Vorrichtung zur Entfernung von Schwefelwasserstoff und Mercaptanen aus Flüssigkeiten- und Gasströmen). Text in German. (Société des Unions Chimiques, Rhone-Poulenc, Paris (France)) W. Ger. Pat. Appl. 2,237,179, 42p., July 28, 1972, (3 claims).

A process and device for the removal of hydrogen sulfide and alkyl mercaptans from liquid and gas flows in a counterflow washing tower are described. The liquid or gas from which H₂S or alkyl mercaptans are to be removed are finely dispersed in a catalytic liquid consisting of an aqueous solution of the chelate of a polyvalent metal, such as iron, cobalt, or nickel, in the presence of a strongly alkaline amine. Then sulfur and dialkyl disulfide are formed, respectively, in a continuous catalytic oxidation and reduction process, without any need for the regeneration of the catalytic liquid. Both H₂S and alkyl mercaptans are removed from gases and liquids practically quantitatively. After the catalytic reaction, the gaseous and liquid phases are separated in a separate unit after the reaction zone.

38040

APTIC NO. 60611

Sakai, Toshiyuki, Kazuhide Miyazaki, Yutaka Ushimaru, and Michiaki Yamamoto

CATALYST FOR THE CONVERSION OF GASES AND PROCESS FOR ITS PREPARATION. (Katalysator zur Umsetzung von Gasen und Verfahren zu ihrer Herstellung). Text in German. (Mitsui Mining and Smelting Co. Ltd., Tokyo, Japan) W. Ger. Pat. Appl. 2,236,624, 31p., July 26, 1972, (16 claims).

A catalyst for the conversion of carbon monoxide and/or hydrocarbons in exhaust gases and in industrial waste gases and a process for its preparation, are described. The catalyst excels by high catalytic activity, high temperature resistance, and high mechanical strength. The catalyst is composed of catalytic plated metal oxides, of catalytic, non-plated metal oxides, and of fully or partially plated clay, silica, or magnesia. The oxides of manganese, copper, iron, chromium, nickel, cobalt, bismuth, zinc, lead, or compounds of these oxides are used as catalytic oxides particles which are plated in a nonelectrolytic process with metals supporting the catalytic activity, such as copper, iron, nickel, cobalt, chromium, tin, or silver. The quantity of the plating metals ranges from 0.1 to 10% by weight. The catalyst particles, containing catalytic oxides as well as iron and/or zinc powder, are immersed in aqueous solution of water-soluble salts of the corresponding plating metals.

38041

APTIC NO. 61181

Schade, Horst and Fritz Baum

FORECAST OF AIR POLLUTION DUE TO STATIONARY FIRING EQUIPMENT-GENERATED WASTE GASES IN NORTHRHINE WESTFALIA DURING THE PERIOD ENDING 1980. (Prognose der Luftverunreinigung durch Verbrennungsabgase aus stationären Feuerungsanlagen im Lande Nordrhein-Westfalen bis 1980). Text in German. *Gesundh.-Ingr.*, 93(11):321-348, 1972. 12 refs.

A forecast of the particulate matter and sulfur dioxide emissions from stationary firing equipment in thermal power plants, industrial plants, and households in North Rhine-Westphalia is presented for the period ending 1980 on the basis of the 1969 situation. The brown coal consumption of thermal power plants, and both the oil and natural gas consumption in all three sectors are expected to rise, while the bituminous coal consumption will decline. At the current stage of advancement of the dust separation techniques, the dust emission would fall 16% from 538,000 tons in 1969 to 450,000 tons in 1980, whereas the SO₂ emission would rise about 42% from 1,480,000 tons to 2,110,000 tons during the same period. By the implementation of adequate control measures such as dust separators in thermal power plants, industries, and oil-fired equipment, and the replacement of smoking coals by non-smoking fuels and fuel oil in households, it will be possible to reduce the particulate matter emission to 82,000 tons. The SO₂ emission can be reduced to 1,100,000 tons by the use of fuel oils with a sulfur content of less than 1% in industrial plants, of fuel oils with 0.3% sulfur content for domestic heating purposes, by flue gas desulfurization and coal desulfurization in power plants, and by fuel desulfurization to 1% sulfur for industrial use.

38042

APTIC NO. 64965

Schwan, Ruediger

DUST SEPARATION BY MEANS OF NEEDLE-PUNCHED FELT. (Nadelfilz scheidet Staub ab). Text in German. *MM-Industriejournal*, 78(30):652-656, 1972.

The characteristics and advantages of special needle-punched felt filter tissues, and the use of such filter tissues for the separation of metal soap dusts, are described. Special needle-punched felt filters have asymmetric, though homogeneous, fiber distribution, uniform pore sizes, and uniform pore distribution. With the target surface of needle-punched felt filters smoothed, the filtration resistance is practically constant, and the filter cake, if it fails to fall off, can be easily removed. A special needle-punched felt filter was installed after a cyclone for coarse dust separation for the separation of fine adhesive metal soap dust in a chemical plant. The combination of the cyclone with the needle-punched felt filter had a dust separation efficiency of 99%, reducing the dust concentration from an initial value of 15 g/cu m to 0.045 g/cu m.

38043

APTIC NO. 60847

Shultz, E. A., W. E. Miller, R. E. Barnard, and W. R. Horlacher

THE CAT-OX PROJECT AT ILLINOIS POWER. *Proc. Am. Power Conf.*, vol. 34:484-490, April 1972.

The catalytic oxidation method developed by Monsanto Enviro-Chem Systems, Inc., for removing sulfur dioxide from flue gas of fossil-fuel generating stations is scheduled for its first commercially-sized installation operation in June 1972 on the 100-MW Wood River No. 4 unit of the Illinois Power Company. The unit consists of a reheater, natural-circulation, balanced-draft, pulverized-coal, tangentially-fired boiler with steam conditions of 1500 psig and 1005 F at the superheater outlet. The Cat-Ox System is being designed for a flue gas flow rate of 1,120,000 lbs/hr, which is equivalent to a load of about 110 MW. The unit will burn approximately 275,000 tons of 3.1 sulfur content coal/yr. The Cat-Ox System will produce about 19,000 tons/yr of equivalent 100% sulfuric acid. The

system will cost \$6,800,000 in capital costs for design and construction. Operating and maintenance costs are expected to run \$400,000/yr; assuming a price of \$8/ton of acid, the net operating and maintenance costs could be about \$300,000/yr. The operation of the Cat-Ox System consists basically of the following phases: fly ash collection, conversion of SO₂ to sulfur trioxide, heat recovery, removal of H₂SO₄, acid mist elimination, and acid storage and loading. The project timetable calls for completion of all phases by June 1973. A 24-hour test will be conducted to ensure that the system produces at least 77.7% H₂SO₄, operates with a gas flow of 1,120,000 lbs/hr entering the system at 310 F, emits no more than 1.0 mg of 100% SO₂ mist/cu ft of flue gas, converts at least 90% of the SO₂ to SO₃, removes 99% of the fly ash, and removes 85% of the SO₂ in the flue gas entering the system.

38044

APTIC NO. 60867

Szweid, Henryk and Jan Wrobel

DESULFURIZATION OF GASES FROM METALLURGICAL PROCESSES. (Odsiarczanie gazow z procesow hutniczych). Text in Polish. *Zesz. Nauk. Akad. Gorn.-Hutn. Stanislaw Staszica Zesz. Spec.* 32, no. 356:171-182, 1972. 2 refs.

Desulfurization of industrial combustion gases with special regard to the metallurgical industry is described. Sulfur dioxide is removed from combustion gases from iron-ore agglomerating plants by dolomite limestone. For greater efficiency the apparatus uses a fluidized bed. A system for measuring SO₂ sorption by limestone is given. Laboratory and industrial investigations of SO₂ adsorption by limestone show that small-grain limestone, a by-product of the production of lime in iron-works, can be used as a sorbent for desulfurization of combustion gases. Desulfurization efficiency of 50% can be obtained in a single fluidized bed apparatus for an initial SO₂ concentration in the gases of about 700 mg/cu m. Pressure loss in the fluidized bed is low compared to the pressure loss of non-fluidized beds and amounts to 50-70 mm H₂O for a gas velocity of 1 m/sec, an initial height of the bed of 40 mm, and a height of the fluidized bed of 220 mm. The consumption of the sorbent was 3-4 g/g of the adsorbed SO₂.

38045

APTIC NO. 60966

Tomek, Jiri

TREATMENT OF POWDERED POWER-PLANT WASTE MATERIALS BY COLD PELLETIZATION. (K racionalizaci vyuziti upravy praskovych energetickych odpadu studenou peletizaci). Text in Czech. *Rudy*, no. 1:14-16, 1972. 4 refs.

Cold pelletization was investigated as a means of safe disposal and with a view to utilization of the powdered waste materials. Eleven samples, obtained from eight power plants, varied widely in density and particle size distribution. The powdery material was mixed with water and compressed, without any heat treatment. For better mechanical stability, the water was sometimes replaced by a 5% clay suspension, or by industrial sludge suspensions. The optimum water: dry-material ratios for the 11 samples varied (from 24.5 to 43%). The pellets were graded by their mechanical strength, their compressibility, and their dusting tendency. A sample having a low content of coarse particles (2.8% greater than 0.2 mesh) and a high content of fines (63.4% less than 0.6 mesh) produced the best pellets (dust loss 0%). These pellets are easily re-ground; they are currently being used as a hydraulic additive in a pilot-scale concrete production. Other uses which seem worth investigating: as filling material in mining operations, both underground and strip mining; for drying up marshland; and as a porous subgrade material in road building.

38046

APTIC NO. 60624

Urban, Peter

CONTINUOUS SCRUBBING OF SULFUR DIOXIDE FROM A GAS STREAM. (Verfahren zum Auswaschen

von Schwefeldioxyd aus einem Gasstrom). Text in German. (Universal Oil Products Co., Des Plaines, Ill.) W. Ger. Pat. Appl. 2,240,025. 42p., Aug. 16, 1972. (12 claims).

A process is described for washing sulfur dioxide-containing gas with a countercurrent, absorbent stream of an aqueous solution such as carbonates and bicarbonates of ammonia, sodium, potassium and alkaline earth metals. The gas is emitted, and an aqueous liquid containing a water-soluble sulfite is obtained. Part of the liquid is recirculated and part is heated to approximately 65 deg. It is then passed to a first reaction zone where it is treated countercurrently with a gas containing hydrogen sulfide and carbon dioxide at approximately 200 psig, converting greater than or equal to 95% of the sulfites to thiosulfates. This liquid is mixed with hydrogen and treated with a reducing catalyst at approximately 300 deg under sufficient pressure to maintain the liquid state to produce a substantially thiosulfate-free liquid containing many hydrosulfides, for example, ammonium thiosulfates; 89% is converted to ammonium hydrosulfide and less than 5% to the undesired ammonium sulfate. The liquid is passed through a stripping zone where a gas containing H₂S and CO₂ is passed upwardly to reform the carbonate and H₂S. A portion of the H₂S is recirculated, but the main portion is drawn off for recovery of the sulfur, the latter portion representing the new S obtained from the flue gas. The remaining liquid is reused in the initial scrubbing.

38047

APTIC NO. 68567

Wright, E. S., L. E. Greenwald, and R. R. Titus

AUTOMOTIVE GAS TURBINE OPTIMUM CONFIGURATION STUDY. United Aircraft Research Labs., East Hartford, Conn., Environmental Protection Agency Contract 68-04-0013, APTD-1290, Rept. L-971249-7, 293p., May 1972. 33 refs.

NTIS: PB 214515

A comprehensive analysis of gas turbine engines designed for automotive propulsion is described. Simple cycles, regenerated and recuperated cycles, cycles including intercooling and reheat, single shaft and free turbine engines, and a combined gas turbine and Rankine cycle were evaluated over a range of pressure ratios and turbine inlet temperatures for an initial total of 60 separate candidate cycles. The selected engines were subjected to a more detailed preliminary design analysis which included a comprehensive study of fuel control, transmission, and installation considerations. The single shaft simple cycle gas turbine offers the highest probability of meeting the Office of Air Programs goals for emissions and performance, and capable of being developed by 1975. The base line engine is rated at 130 hp, under standard conditions, utilizing a high efficiency single-stage centrifugal compressor capable of a pressure ratio of 10:1, and a single stage radial inflow turbine. Improvements in emissions are required and can probably be achieved by 1975 if adequate programs are implemented. (Author summary modified)

38048

APTIC NO. 68671

Olson Labs., Inc., Anaheim, Calif.

ANALYSIS OF EFFECTIVENESS AND COSTS OF RETROFIT EMISSION CONTROL SYSTEMS FOR USED MOTOR VEHICLES. VOLUME IV. TEST AND ANALYTICAL PROCEDURES. (FINAL REPORT). Office of Air Programs Contract 68-04-0038, Rept. 71Y233, Rept. APTD-1338, 154p., May 1972.

Test and analytical procedures are outlined for a program which evaluated the effectiveness and costs of retrofit methods for control of emissions from gasoline-powered, light-duty used automobiles. Subjects covered include: retrofit method survey (survey approach, recording system, and retrofit method classification system); system tests involving emissions, driveability, and durability; system descriptions; and performance analysis in terms of evaluation methodology equations and methodology implementation. Appendices are

included for: request for retrofit source identification, letter of inquiry to retrofit developers, news release, retrofit data questionnaire and transmittal letter, excerpts from California Health and Safety Code applicable to retrofit methods for vehicle emission control, California blowby device test procedure, and computer program printout for analytical methodology.

38049

APTIC NO. 68732

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

TRAFFIC-GENERATED EMISSIONS. (Die Emittenten-gruppe Verkehr). Text in German. In: Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980. p. 75-81, 1972.

The evolution of traffic-generated air pollution in West Germany in general and in North Rhine-Westphalia in particular is outlined along with proposals for the abatement of such emissions. While the emissions from railroad and ship traffic have abated considerably during the last years, those from aircraft and automobiles have increased immensely due to the increase in the number of vehicles in use. While the number of vehicles is expected to rise by 58% in 1985, the increase in the pollutant emissions will be less than proportional due to the trend of reducing yearly mileage. Recent regulations concerning the limitation of carbon monoxide and crankcase hydrocarbon emissions will result in a slowdown of the rate of increase of such emissions, while the increase in the nitrogen oxides emissions will be disproportionately high. The gasoline lead content, already limited to 0.4 g/l fuel, will be further reduced to 0.15 g/l. The further abatement of traffic-related pollutant emissions will require systematic air quality monitoring around airports, lower limits on CO, HC, and NO_x emissions from automobiles, and inspection of diesel vehicles for the abatement of smoke emissions. The new limits proposed on CO, HC, and NO_x emissions from passenger cars are 3 g/km, 0.3 g/km, and 0.25 g/km.

38050

APTIC NO. 68743

Olson Labs., Inc., Anaheim, Calif.

ANALYSIS OF EFFECTIVENESS AND COSTS OF RETROFIT EMISSION CONTROL SYSTEMS FOR USED MOTOR VEHICLES. VOLUME V. APPENDICES. (FINAL REPORT). Office of Air Programs Contract 68-04-0038, Rept. 71Y233, Rept. APTD-1339, 277p., May 1972.

Appendices covering raw data documentation are presented as part of a retrofit study program designed to gather and develop information concerning emission control devices that are available for retrofit to used automobiles. Documentation is provided for data survey results, an inventory of retrofit source data, and a data survey (questionnaire responses). An alphabetical index is included for development sources of retrofit devices evaluated.

38051

APTIC NO. 68744

Olson Labs., Inc., Anaheim, Calif.

ANALYSIS OF EFFECTIVENESS AND COSTS OF RETROFIT EMISSION CONTROL SYSTEMS FOR USED MOTOR VEHICLES. VOLUME II. SYSTEM DESCRIPTIONS. (FINAL REPORT). Office of Air Programs Contract 68-04-0038, Rept. 71Y233, Rept. APTD-1336, 473p., May 1972. 124 refs.

A systems description report which documents the physical, functional, and performance characteristics of candidate retrofit methods, their installation requirements, and costs is presented as part of a retrofit study program designed to gather and develop information concerning emission control devices that are available for retrofit to used automobiles. Emission control methods covered include: exhaust gas control systems (catalytic converters, thermal reactors, afterbur-

ners, exhaust gas filters, and exhaust gas backpressure controls; induction control systems (air bleed to intake manifold, exhaust gas recirculation, various engine and carburetor modifications, and electronic fuel injection); ignition control systems; fuel modification (liquid petroleum gas conversion, fuel additives, and electromagnetic field exposure); crankcase emission control systems; evaporative emission control systems; and emission control combinations.

38052

APTIC NO. 60756

TRW Transportation and Environmental Operations, Redondo Beach, Calif., Land Use Planning Branch

TRANSPORTATION CONTROL STRATEGY DEVELOPMENT FOR THE GREATER HOUSTON AREA. (FINAL REPORT). Office of Air Quality Planning and Standards Contract 68-02-0041, Proj. DU-72-B893, Rept. APTD-1373, 188p., Dec. 1972. 50 refs.

Control measures are presented that, if fully implemented, will allow achievement of ambient air quality standards in the Greater Houston Area by 1977; the measures pertain to control of photochemical oxidants and carbon monoxide. Phase I measures include: continued evaluation of control measures with expansion of the air monitoring program and initiation of a regular review of air quality and emission inventory data; tightening and expanding of the Regulation V stationary source controls with inclusion of all counties in the region; implementation of an annual inspection/maintenance program for in-use vehicles; substantial improvement in mass transit; institution of parking measures in all high density areas; initiation of car pool incentives; and promulgation of regulations to control fugitive and evaporative hydrocarbon emissions. Implementation of catalytic converter retrofit on all 1968-1974 automobiles and/or reduction in the vehicle miles traveled during the summer and fall is recommended if at the end of the initial evaluation period in 1974 it is determined that additional hydrocarbon emission reductions are required.

38053

APTIC NO. 60826

Kellogg (M. W.) Co., Piscataway, N. J.

APPLICABILITY OF SO₂-CONTROL PROCESSES TO POWER PLANTS. (FINAL REPORT). Office of Air Program Contract CPA 70-68, EPA-R2-72-100, MWKLG-RED-72-1274, Task 11, 77p., Nov. 1972.

The extent to which sulfur dioxide-control units can be installed in existing oil- and coal-fired power plants was studied. In this and a previous similar study completed in early 1971, 14 different power systems were evaluated having a total oil- and coal-fired generating capacity of 88,520 megawatts, of which 79% had adequate space for retrofitting scrubbers. Most of the systems and plants covered by the 1971 study were also included in this study. To obtain an indication of installation costs, a qualitative retrofit complexity factor was estimated for each boiler unit studied by considering such items as space availability, site assessability, and degree of plant modification. The complexity factor related the cost of retrofitting a control system to the cost of the same system installed on a new power plant. The distribution of relative operating costs over generating capacity was calculated by assuming that investment is proportional to the complexity factor and by incorporating the effect of the unit load factor. Fifty percent of the generating capacity can be retrofitted at a relative cost per kwh of 1.7 to 2.4 times the cost of installing the same control units on new power plants operating at full load. The scrubbing systems considered were limestone, lime, magnesium oxide, ammonia, and sodium scrubbing. (Author abstract modified)

38054

APTIC NO. 60828

Cernoch, Milan and Frantisek Suenderhauf

PILOT PLANT COAL DUST FURNACE AT THE FUEL RESEARCH INSTITUTE. (Poloprovozní praskové ohniste Ustavu pro vyzkum a vyuziti paliv). Text in Czech. In:

Šborník Prednasek. Bechovice, Czechoslovakia, Ustav pro Vyzkum a Vyuziti Paliv, 1972, p. 91-103.

Design and construction of a pilot-scale furnace to study the combustion of pulverized brown coal are described. A single, horizontal, turbulent burner is used. Operational data and capacities are given. The main purpose of the experiments was to establish the conditions for the efficient desulfurization of the combustion products by varying the dosage and the particle size of difference grades of limestone. The lime is mixed with air, and injected into the furnace at a rate of 20 m/sec. The residence time of the lime in the different temperature zones has a marked effect on the removal of SO₂. Means to remove nitrogen oxides are also the subject of ongoing investigations.

38055

APTIC NO. 60849

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

ENERGY GENERATION. (Energieerzeugung). Text in German. In: Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980. p. 40-51, 1972.

The state of the art and the evolution expected until 1985 in particulate matter, sulfur dioxide, nitrogen oxides, and gaseous fluoride emissions from energy generation processes in power plants and in industries in North Rhine-Westphalia are outlined. Reduction of coal consumption, and increase in both fuel oil and natural gas consumption in both power plants and industrial power plants are expected during the period ending 1985. Accordingly, increases in the particulate matter, SO₂, NO_x, and F emissions would be unavoidable without further emission control measures. The installation of automatic recording instruments for the control of the combustion equipment alone would result in a decrease of about 50% in the dust emissions. Limitation of the dust emissions to 150 mg/N cu m in pit coal firings, to 100 mg/N cu m in brown coal firings, and to 0.6 kg/ton of heavy fuel oil by means of centrifugal dust separators would result in a decrease by 70% in the particulate matter emissions. Further decrease would be possible by increasing the efficiency of the dust separators in coal-firing equipment, and thereby limiting the dust emissions from pit coal firings and brown coal firings to 100 mg/N cu m and to 50 mg/N cu m, respectively. The flue gas desulfurization and coal desulfurization efficiencies are expected to reach 80% and 30%, respectively, and desulfurization of heavy fuel oil to 1% is anticipated. Heavy fuel oil with over 1% sulfur should be used in power plants with flue gas desulfurization, and industrial power plants should use fuel oils with less than 1% S. The SO₂ emissions could be decreased by 54% by the use of fuel oil with a maximum S content of 1%, and of desulfurized coal in power plants equipped with flue gas desulfurization facilities. Flue gas desulfurization would also result in a decrease in the fluoride emissions by about 48%.

38056

APTIC NO. 60852

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

COAL EXTRACTION AND DRESSING. (Kohlegewinnung und -verarbeitung). Text in German. In: Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980. p. 53-55, 1972.

The state of the art and the expected evolution of air pollutant emissions in connection with coal mining and coal processing, namely briquetting and coking, in North Rhine-Westphalia are outlined. All briquetting plants are equipped with adequate dust separating equipment, and the dust emissions will further decrease as a result of the expected reduction by about 50% of all emission sources due to the centralization of briquetting operations in a few, large-capacity units. The reduction of the sulfur content in coal by processing does not lead to increased sulfur dioxide emissions in briquetting plants. Cokeries emit dust, as well as gaseous, malodorous substances. While the

dust separation techniques developed for charging operations are adequate, dust emissions from discharge operations are controlled inadequately. The emissions from quenching towers have been reduced to 1 to 2 kg coke dust/ton by the use of appropriate tissue filters, wet separators, or centrifugal dry separators. Coke gas emissions occur under abnormal operating conditions only, e.g., due to leakage. The introduction of continuous coking, of horizontal chamber furnaces, the development of emission control techniques for the coke discharge process, and the use of closed spaces for the storage of coal and coke will be necessary for the further abatement of the emissions in coal processing and coking.

38057

APTIC NO. 60853

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

MINERAL OIL AND PETROCHEMISTRY. (Mineralöl und Petrochemie). Text in German. In: *Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980*. p. 26-31, 1972.

The state of the art and possibilities anticipated for the reduction of the hydrocarbon and sulfur dioxide emissions from petroleum refineries and petrochemical plants during the period ending 1980 are outlined. Organic vapors and gases are emitted mostly as evaporation and leakage losses from a multitude of scattered sources, and from torches. Sulfur dioxide is generated in combustion processes, desulfurization, and Claus processes. The total HC loss is estimated at 1% of the total production, of which loss about one third is emitted to the atmosphere. The SO₂ emission can be abated by increasing the efficiency of the Claus plants to 99.5% by the introduction of the three-stage process. Hydrocarbon emissions due to leakage can be reduced by using tight, closed systems, and by collecting the losses for possible recycling or central incineration in torches. Waste gases discharged during startup and shutdown operations should be incinerated in ground flares rather than in high torches. Storage tanks should either be equipped with floating covers or connected to collection lines for the collection of evaporation losses. Closed systems for the collection and destruction of waste waters contaminated with mineral oil products should be used to prevent emissions from such effluents. The introduction of these measures is expected to considerably slow down the rate of increase in the SO₂ and HC emissions despite an increase of 100% or more in the capacity of the petrochemical industry by 1980.

38058

APTIC NO. 60864

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

CHEMICAL INDUSTRY. (Chimie). Text in German. In: *Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980*. p. 14-26, 1972.

The state of the art and the expected evolution of air pollutant emissions in different branches of the chemical industry in North Rhine-Westphalia are outlined. The output of the chemical industry is predicted to rise by 320% by 1985, and new products will also cause new emission problems. The increase in the output will be highest in the most emission-intensive branches, e.g., plastic materials, synthetic fibers, and other organic materials. Organic gases and vapors, such as aldehydes, ketones, carbonic acids, organic sulfur and nitrogen compounds, hydrogen sulfide, sulfur dioxide, hydrochloric acid, fluorine compounds, carbides, arsenic, asbestos, and dusts of ferroalloys are the basic pollutants emitted by chemical plants. Since the emissions from synthetic fiber manufacturing plants would increase by 420% by 1985, all new plants to be put into operation in 1973 or later will have to be equipped with adequate emission control equipment for an emission abatement of 80%, and a similar reduction will be required for old plants from 1978. The same degree of emission abatement will be required for all new and old production plants in the pesti-

cide manufacturing area from 1973. The SO₂ emissions from sulfuric acid production can be lowered by 85% by the introduction of the Bayer double-contact process. The nitrous gas emissions from nitric acid production can be abated by 88% by catalytic reduction by means of natural gas or hydrogen. Abandonment of open-air operations, leakage control, automatic control of chemical processes, total, multi-stage or combined purification of malodorous and toxic emissions, and the use of recording analytical instruments are the basic possibilities of emission abatement in the chemical industry as a whole.

1971

38059

APTIC NO. 60860

Denel, C. L.

A STUDY OF PHYSIOCHEMICAL FACTORS AFFECTING CHARCOAL ADSORPTION OF CONTAMINANTS IN MANNED SPACECRAFT ATMOSPHERE. (FINAL REPORT). Research Labs., Inc., Monrovia, Calif., National Aeronautics and Space Administration Contract NAS 9-11049, 144p., Aug. 1971. 8 refs.

NTIS: N71-37657

Data generated from a study of analytical stripping procedures for compounds adsorbed on charcoal, as well as data on time and temperature variations in thermal-vacuum stripping, are presented as part of an evaluation of physiochemical factors affecting charcoal adsorption of contaminants in manned spacecraft atmospheres. Comparison is made for six storage materials and/or containers used for maintaining contaminant free charcoal, and a listing is given of more than 20 compounds apparently formed by catalytic action of charcoal on a prepared gas mixture. Gas evolution studies from mass spectrometric examination of heated charcoal is also summarized, and a rather extensive program of development of adsorption isotherms with mathematical modeling as well as the derivation of the mathematics involved is listed. The results from application of predicted adsorption capacity of a prepared mixture indicate successful application of the modeling. A brief study on the efficiency of adsorption-desorption of compounds on two charcoals of different origins as well as on 5A molecular sieve is also provided. (Author abstract modified)

38060

APTIC NO. 60830

Doerr, Karl Heinz, Hugo Grimm, Michael Tacke, and Robert Peschl

REMOVAL OF SULFUR TRIOXIDE AND SULFURIC ACID MIST FROM WASTE GASES. (Verfahren zur Entfernung von SO₃ und Schwefelsaurenebeln). Text in German. (Metallgesellschaft AG, Frankfurt (West Germany) and Sued-Chemie AG, Munich (West Germany)) W. Ger. Pat. Appl. 2,145,546. 12p., Sept. 11, 1971. 13 refs. (8 claims).

Sulfur trioxide and sulfuric acid can be removed from the waste gases of an H₂SO₄ contact plant using a venturi scrubber. Waste H₂SO₄ is sprayed into the waste gas at 50-90 deg with steam enrichment, and H₂SO₄ is removed. Thus, 1.9 cu m/hr of 74.4% H₂SO₄ at 65 deg is sprayed into a waste gas flow of 200 cu m/hr at 88 deg to decrease the mist and sulfur trioxide content from 470 to 2.9 mg SO₃/cu m.

38061

APTIC NO. 60453

Gilpin, Alan

AIR POLLUTION CONTROL TECHNIQUES. In: *Air Pollution*, St. Lucia, Australia, University of Queensland Press, 1971, Chapt. 5, p. 29-49. 6 refs.

Smoke is defined and some of its sources in the United States and Britain enumerated. A formula for the relation between visual range and particulate concentration is given. The problem of pollution from jet aircraft at airports is considered,

but it is pointed out that this source contributes very little to total environmental pollution. A discussion of the dust and grit problem includes a list of control methods, various nations limits on emissions, and the results of control methods in industrial installations. Pittsburgh is described as an example of smoke pollution and its control. The problem of sulfur dioxide emissions is controllable by desulfurization of fuels and removal of SO₂ from flue gas. Also, dispersal by high chimneys has been an effective solution in Great Britain. Motor vehicle emissions are broken down into those from gasoline and diesel fuel burning vehicles. For gasoline vehicles positive crankcase ventilation, and air injector reactor system, and alternative fuels are presented as control measures. The main problems presented by diesel engines are those of smoke and fumes. An excess fuel device is presented as a solution.

38062

APTIC NO. 60513

Goergen, R.

A STUDY OF ENVIRONMENTAL CONDITIONS AND PROBLEMS IN THE METAL INDUSTRY. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 65-74, 17 refs. (May 2-15.)

Ore dressing operations, steelworks, rolling mills, coking plants, foundries, and power plants in the iron and steel industry produce dusts, red fume, sulfur dioxide, and other emissions. Water, air, and noise pollution control methods are reviewed. Steel production in Germany, investments of the chemical, mining, iron and steel, and other industries for air pollution control in North Rhine-Westphalia, and water disposal and water pollution control are discussed.

38063

APTIC NO. 60520

Gustavson, Karl Axel Goran

DEVICE FOR THE WET CLEANING OF GASES. (Vorrichtung fuer die Nassreinigung von Gasen). Text in German. (Aktiebolaget Ilahco Ventilation, Enkoping (Sweden)) W. Ger. Pat. Appl. 2,144,382. 13p., Sept. 4, 1971. (2 claims).

A device for the wet cleaning of gases is described. The device is composed of a wetting unit, a treatment unit, a droplet separator, and a settling tank communicating with the wetting tank. The gas to be cleaned is admitted into the wetting tank nearly perpendicularly to the liquid surface, from which it entrains liquid droplets into the treatment unit that constitutes a vertical tube. The liquid from the droplet separator is recycled to the wetting tank which at its bottom connected to the settling tank.

38064

APTIC NO. 60677

Hofstadt, Carl-Ernst, Rudolf Fahn, Michael Schneider, and Ginter Donga

CATALYSTS FOR THE PURIFICATION OF AUTOMOTIVE EXHAUST GASES. (Katalysator, Verfahren zur dessen Herstellung und Verwendung desselben zur Reinigung von Abgasen aus Verbrennungskraftmaschinen). Text in German. (Sued-Chemie AG, Munich (West Germany)) W. Ger. Pat. Appl. 2,143-789. 18p., Sept. 1, 1971. 8 refs. (15 claims).

Catalysts are described for the purification of automotive exhaust gases. They have high abrasion resistance, and consist of platinum (0.1-0.3), nickel or cobalt (2.5-5.0), alkali, metal, and less than 0.05% sulfur. They can remove carbon monoxide and nitrogen oxides from internal combustion engine exhausts. A suspension of aluminum ethoxide was filtered, the cake dried at 120 deg, granulated to a particle size less than or equal to 0.5 mm, pelleted, and calcined at 600 deg for 5 hr. The resulting supports were impregnated with aqueous nickel nitrate calcined at 400 deg, impregnated with aqueous H₂PtCl₆, and calcined for 6 hr at 600 deg to give a catalyst containing 0.1 and 3.0% nickel with a breaking strength of approximately

16 kg. The catalyst was contacted with a mixture of exhaust gases containing 2.5-3.0 vol% CO, 500-1200 ppm hydrocarbons (as hexane), carbon dioxide, nitrogen, steam, and 5-10% oxygen to give a CO content of less than 25 ppm and a hydrocarbon content of 40 ppm after 170 hr versus 5000 ppm CO content for a reference catalyst. The NO_x content measured in the acceleration phase under reducing conditions was 160 ppm after 200 hr versus 240 ppm for a reference catalyst.

38065

APTIC NO. 60970

Ivanova, R.

METHOD FOR THE REMOVAL OF NITROGEN OXIDES

FROM WASTE GASES. (Metodi za ulavyane na azotnite okisi ot otpadnite gazove). Text in Bulgarian. Khim. Ind. (Sofia), no. 43:124-127, March 1971.

Methods currently available for the removal of nitrogen oxides from industrial waste gases are described. With nitrogen dioxide and nitric oxide present in equimolar ratios, removal of these oxides is possible by sorption with alkaline compounds to obtain nitrates and nitrites; by conversion of the nitrogen oxides into ammonium nitrite and nitrate aerosols for subsequent separation in electrostatic precipitator; or by absorption with concentrated sulfuric acid. If the equimolar ratio of NO₂ and NO can not be maintained, removal of these nitrogen oxides is possible by oxidation with ozone to nitric acid; by absorption in hypochlorite; by adsorption on activated carbon, silica gel, or other adsorbents; by adsorption in solutions of the oxides of the iron group; by absorption in nitric acid solution of copper sulfate; and by catalytic reduction by means of palladium catalyst in the presence of hydrogen. Both NO₂ and NO can be effectively absorbed in solutions of sodium hydroxide, sodium carbonate, and ammonia. Powered calcium hydroxide with 8% water is also suitable for adsorption, and so is iron sulfate in foam apparatuses. Solid magnesium, strontium and barium hydrates, activated carbon, silica gel, aluminosilicate, and lead dioxide are also used for the removal of NO and NO₂ from waste gases.

38066

APTIC NO. 60681

King, John E.

REDUCTION OF SULFUR DIOXIDE USING MICROWAVE DISCHARGE TECHNIQUES. Air Force Inst. of Tech., Wright-Patterson AFB, Ohio, School of Engineering, Rept. GE/ME/72-1, 66p., Dec. 1971. 20 refs. NTIS, DDC: AD 741258

Sulfur dioxide concentrations were reduced in a microwave discharge to investigate a possible system for industrial application. An 85 watt, 2450 MHz microwave power generator and resonant cavity were employed to sustain the discharge in a low pressure system, and static discharge tests of varied time duration were conducted to determine the dependence of SO₂ reduction on molecular residence time. The reduction of pure SO₂ in the discharge resulted in the formation of sulfur trioxide and sulfur; and, since the net reduction of SO₂ was unacceptable for industrial use, investigations of SO₂ mixed with selected gases were performed. Carbon dioxide and ethylene were found effective in improving the net reduction of SO₂ in short term discharges (5-20 sec). A flow system was established to simulate an industrial gas flow; however, realistic volumetric flow rates could not be achieved due to restraints imposed by the experimental apparatus. A pure SO₂ and a SO₂-C₂H₄ mixture was investigated, and visible quantities of sulfur products were precipitated in a cooled U-tube downstream of the discharge. This experiment indicated that the reduction of SO₂ concentrations by means of a microwave discharge process does have possibilities for industrial application. (Author abstract modified)

38067

APTIC NO. 60953

Kohler, W. and G. Funke

DUST EMISSION CONTROL IN THE WEST GERMAN CEMENT INDUSTRY. (Comment l'industrie du ciment de la République Fédérale Allemande contrôle les émissions de poussière). Text in French. Cim. Chaux, no. 603:26-29, June 1971.

The state of the art of dust emission control techniques in the West German cement industry is outlined. The specific dust emission in the cement industry has been reduced from 3-5% in 1950 to 0.15% of the cement production, entailing an absolute decrease despite stepped-up production. The rotary kilns are equipped with electrostatic precipitators for dedusting the waste gases leaving the kilns in a temperature range of 90-180 C. Clinker dust is separated by cyclones and multicyclones, and, quite recently, by gravel filters. Dust generated by crushers, mills, screens, and transport equipment is separated by tissue filters made of synthetic fibers.

38068

APTIC NO. 60647

Loquenz, Heinz and Horst Weber

PROCESS AND DEVICE FOR THE CLEANING OF GASES CONTAINING PARTICULATE OR GASEOUS POLLUTANTS. (Verfahren und Vorrichtung zum Reinigen staubhaltiger oder durch Schadgasbestandteile verunreinigter Rohgase). Text in German. (Wagner-Biro AG, Vienna (Austria), W. Ger. Pat. Appl. 2,163,718. 6p., Dec. 22, 1971. 7 refs. (8 claims).

A process and device for the separation of particulate and gaseous pollutants from raw gases by means of a venturi tube are described. The raw gas, admitted in an upward direction in the converging section of the venturi tube, disintegrates the wash liquid coming from the opposite direction into very fine droplets. The partial flows of the raw gas are united again at the smallest cross section of the venturi tube. The liquid droplets are separated in a two-stage cyclone.

38069

APTIC NO. 60918

Nakajima, Yasuo, Yoshimasa Hayashi, and Sin-ichi Nagumo

EXHAUST GAS AFTERBURNER. (Abgas-Nachverbrennungsanlage fuer Fahrzeug-Brennkraftmaschinen). Text in German. (Nissan Motor Co., Ltd., Yokohama (Japan)) W. Ger. Appl. 2,037,418. 7p., Feb. 18, 1971. 3 refs. (2 claims).

An exhaust gas afterburner providing for efficient afterburning under all operating conditions of the engine and vehicle is described. The afterburner is composed of an inner cylindrical housing connected to the engine exhaust flange which is enclosed by a coaxial cylindrical outer housing, and of a bypass pipe with a butterfly valve. The outer housing is connected with the silencer through a main exhaust pipe, and the inner housing through the bypass pipe. The butterfly valve in the bypass pipe is open, thus bypassing the afterburner, when either a tachometer indicates that a certain speed (80 km/h) is exceeded, or a diaphragm in the suction line indicates that the vacuum of 150 mm Hg is exceeded.

38070

APTIC NO. 60895

Raask, E. and A. W. Stannett

LIGHTWEIGHT ELECTRICAL INSULATION USING ASH CENOSPHERES. Elec. Times, 159(10):39-40, March 12, 1971.

Resins filled with 50% by weight ash cenospheres (75% by volume) are of interest as lightweight materials for electrical insulation. The density of such material is about 750 kg/cu m compared with 2200 kg/cu m for a resin filled with dense particles of silica. The ash particles do not affect the electrical properties of resin at high frequencies. There is an increase in loss tangent at power frequencies when cenospheres are added to resin, but the effect is smaller than that caused by dense

particles of silica. The ash can be obtained from waste fly ash produced during burning of coal in power plants. Physical, electrical, thermal, and compositional properties of the ash cenospheres are reviewed. (Author conclusions modified)

38071

APTIC NO. 60865

Scharpf, Carl A.

SITE-RELATED ASPECTS OF A THERMAL MULTIPURPOSE ENERGY CENTER. Preprint, American Inst. of Chemical Engineers, 17p., 1971. 18 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 64th, San Francisco, Calif., Nov. 28-Dec. 2, 1971.)

Cost-savings can occur if power plants are combined with industrial plants. The heat from the industrial plant can be recycled into the power plant to reduce costs. By burning less fuel, pollution is reduced. Integrated operations can also be used where coal and lignite are converted into synthetic fuels and in geothermal plants. Geothermal plants around the world generate close to 1500 MW. Two advantages of a dual-purpose facility are the more efficient use of the input energy with the resultant added advantage of having less heat dissipated to the surroundings and the cost economies that accrue from going to larger size steam generating units. Potential problems are that the dual-purpose site would require a reliable supply of power, allow less freedom of operation, and may give a surplus or a deficit of electric power. Despite the trend toward larger turbines, almost 2/3 of the heat input must be dissipated as latent heat of condensation by cooling towers or ponds. The initial investments of cooling by once-through are 2-3 and 3-5 \$/kw for nuclear plants, by ponds are 4-6 and 6-10 \$/kw, by wet towers are 6-8 and 8-12 \$/kw, and by dry towers are 20-25 and 25-30 \$/kw for fossil and nuclear power plants, respectively. An example is given of the use of a combined facility at a chemical firm requiring 600 MW of power and 2000 tons/hr of process steam. A cost/benefit analysis is given for nuclear and fossil fuel power plants in the dual-purpose system.

38072

APTIC NO. 60519

Seese, Friedrich E.

DEVICE FOR DUST SEPARATION FROM INDUSTRIAL WASTE GASES. (Vorrichtung zur Entstaubung von Industrieabgasen). Text in German. (Ignis Huetttenbau AG, Duesseldorf (West Germany)) W. Ger. Pat. Appl. 2,144,356. 9p., Sept. 4, 1971. (4 claims).

A device for dust separation from flue gases generated by industrial combustion processes is described. The gases to be dedusted are admitted into a venturi tube in which wash liquid, preferably, water, is added to the waste gas in the zone of its maximum speed. Part of the cleaned waste gas is recirculated within the dust separation process to level off fluctuations in the volume of the flue gases to be cleaned. The rate of admission of the purified waste gas is determined by the difference of the nonpurified waste gas and the maximum possible flue gas volume. The venturi tube is equipped with a flow-meter.

38073

APTIC NO. 60898

Szwed, Henryk

THEORETICAL ANALYSIS AND RESULTS OF INVESTIGATION OF A MECHANICAL-ELECTRICAL DUST SEPARATOR. (Analiza teoretyczna i wyniki badan odpylacza mechaniczno-elektrycznego.) Text in Polish. (Source not given.) 1971:6-11, 1971 (?). 7 refs.

The motion of particulates in a gas flow are analyzed during separation in an electrostatic precipitator and a centrifugal separator. The direct connection of the mechanical dust separator to the electrostatic mechanism can cause the transfer of the vortex from the axial centrifugal separator to the electrostatic filter and thus impair separation efficiency. The vortex produced by the centrifugal separator decays in the collector. The axial centrifugal dust separator produces a uniform

distribution of the velocity field and dust concentration over the entire cross-section of the electrostatic chamber. The equipment is not sensitive to variations in gas velocity ranging from 21.5 g/cu nm. The use of electrostatic precipitators in combination with centrifugal separators is economically justified when the need for efficiency of the entire unit is in excess of, 96% and the efficiency of the centrifugal separator in excess of 50%.

38074

APTIC NO. 60899

Vickers, P. T., C. A. Amann, H. K. Mitchell, and W. Cornelius
THE DESIGN FEATURES OF THE GM SE-101 -- A VAPOR-CYCLE POWERPLANT. In: Vehicle Emissions, Part III, Papers From 1967-70. Society of Automotive Engineers, Inc., New York, Rept. 700163, p. 692-714, 1971. 32 refs.

The continuous combustion of a vapor-cycle powerplant was studied as a means of lowering pollution. The design and construction of a steam powered passenger car are discussed in terms of modern technology and requirements. The power fluid selection, cycle selection (based on the Rankine cycle), expander selection, accessory drives, overall engine concept, steam generator design, feedwater system, power train, toric transmission, combustion system, mechanical arrangement of the combustion system, combustion system evaluation, condenser, control system, temperature and pressure sensors, digital logic controller, steam throttle, safety features, and automatic starting are reviewed. The steam engine (SE-101) was installed in a Pontiac Grand Prix with complete power accessories including air conditioning. The engine compartment was increased 7 in. in length and the wheelbase was extended 5 in. to accommodate the power plant under the hood. The steam engine weighed 1140 lbs, and about 2.5 times the weight of a spark ignition engine of comparable power output. The emission concentrations for the experimental system might differ from those in a production automobile. The exhaust emissions were superior to those of the conventional gasoline engine as reported on the usual corrected concentration basis. However, much of this advantage was lost when mass emissions were considered. The SE-101 engine used approximately twice the volume of air/unit of fuel burned and as much as twice the fuel was burned/brake hp-hr, compared to conventional engines. Thus, the numerical values on a mass basis for this engine were three to four times larger than might have been predicted for a gasoline engine having the same measured concentrations. The vehicle is operational and is being developed prior to emission, fuel economy, and performance evaluations. (Author summary modified)

38075

APTIC NO. 60705

Weber, Ekkehard and Helmut Buettner

PROBLEMS OF WET DUST PRECIPITATION ESPECIALLY CONSIDERING CONDENSATION EFFECTS. (Probleme der Nassentstaubung unter besonderer Beruecksichtigung von Kondensationseffekten). Text in German. Verfahrenstechnik, 5(9):366-370, 1971. 16 refs.

General problems of wet-type dust precipitation from gases, and the effects of condensation processes of dust separation are discussed. The contact of dust particles carried by gas flows with wash liquid is possible by direct collision of dust particles and liquid droplets; by Brownian motion, of special interest for small-size particles; by condensation, which can be brought about by mixing water vapor or hot humidified gas with cold gas containing dust; by adiabatic expansion in venturi tubes and similar facilities; and by cooling with surface contact or by injection. The condensing humidity is precipitated on the dust particles present in the gas. The dust particles, acting as condensation nuclei, will enlarge, and exhibit increased ability to agglomerate. However, the vapor present in the gas may condense also spontaneously, which hinders dust separation. Provided the condensation takes place on dust particles as condensation nuclei without spontaneous condensa-

tion, the condensation effect may increase the dust separation efficiency.

38076

APTIC NO. 60602

Zenkner, Kurt

PROCESS FOR THE THERMAL AFTERBURNING OF VENT AIR FROM INDUSTRIAL EQUIPMENT, SUCH AS DRYING CHAMBERS AND SIMILAR UNITS, AND DEVICE FOR THE REALIZATION OF THE PROCESS. (Verfahren zum thermischen Nachverbrennen von Abluft aus Industrieanlagen, wie Trockenkammern od. dgl. und Vorrichtung zur Durchfuehrung dieses Verfahrens). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2, 132,797. 19p., July 1, 1971. (18 claims).

A process and device for the thermal afterburning of vent air containing combustible solid, liquid, and gaseous components, as generated in drying chambers is described. The vent air to be purified is admitted into the bottom part of the afterburning chamber that forms a cylinder. During its passage through the upright cylinder, the vent air is heated by hot ceramic spheres falling from the top; these serve as heat-retaining and heat-carrying masses. About at the middle of their passage through the afterburning chamber, the heated combustible components are burned off by means of a group of surface burners which are sheltered by baffle plates roofing off the falling ceramic spheres. The hot gases which pass the burners are cooled by the cold ceramic spheres entering the afterburning chamber.

1970

38077

APTIC NO. 60813

Gustafson, Paul R.

CO₂ ABSORPTION PROPERTIES OF SOME NEW AMINES. In: Progress Report--Chemical Research in Nuclear Submarine Atmosphere Purification. Naval Research Lab., Washington, D. C., Rept. 7037, p. 29-39, June 2, 1970. 7 refs.

NTIS: AD 709896

Due to certain undesirable properties of monoethanolamine (MEA), the regenerative absorbent used in carbon dioxide scrubbers aboard nuclear submarines, a number of CO₂-absorbing chemicals have been studied as potential replacements. The following systems are reported with regard to CO₂ absorption and stripping: amine-N,N-dimethylacetamide-water, amine-Sulfolane (tetrahydrothiophene 1,1-dioxide)-H₂O, amine-N-methyl-2-pyrrolidinone-H₂O, monoethanolamine-hexamethylphosphorotriamide H₂O, amine-dimethylformamide-H₂O, and amine-tetramethylurea-H₂O. The amines were monoethanolamine, 2-(2-aminoethoxy) ethanol, and 3-amino-1-propanol. Another amine (not commercially available), 3-(methylsulfonyl)-1-propylamine, was synthesized and characterized. The three-component system for CO₂ absorption gave preliminary results which indicate that improvements over the present H₂O-amine system could be obtained in the submarine scrubber. A higher rate of stripping was found than that for the amine-H₂O system would reduce the CO₂ in the lean liquid, which, in turn and by better absorption, would reduce the CO₂ level in the submarine atmosphere. The combination of two absorption towers (increasing the air being treated) and one stripper in the submarine scrubber could possibly result in approaching the 0.5% CO₂ level recommended as a maximum for submarine atmospheres. The three-component systems, after a more complete study of those containing Sulfolane, will be compared and the better ones recommended for evaluation on a pilot-size stripper.

38078

APTIC NO. 60515

Margraf, Adolf

GAS FILTER WITH A SERIES OF CHAMBERS. (Staubgasfilter mit in Reihe nebeneinander liegenden Staubgaskammern). Text in German. (Heinrich Luehr VDI

Staubtechnik, Stadthagen (West Germany)) W. Ger. Pat. Appl. 2,017,720. 12p., April 14, 1970. (4 claims).

A filter for removing dust from gases is described. Chambers containing dust bags are connected to pure gas compartments which are linked together by a pipe through a hole at the top of each compartment. The holes are closed sequentially by a moving plate while the gas is purified by a vibrator and/or flushing air. In the pipe, a flexible plate is supported above the center of the cover of each compartment. The hole of each cover has peripherally fixed armatures arranged opposite electromagnets which are disposed about the periphery of the flexible plate and are connected when the plate covers the hole.

38079

APTIC NO. 60917

Muroki, Takumi

EXHAUST GAS AFTERBURNER. (Vorrichtung zum Reinigen der Abgase von Brennkraftmaschinen). Text in German. (Toyo Kogyo Co. Ltd., Hiroshima (Japan)) W. Ger. Pat. Appl. 2,027,732. 6p., Dec. 17, 1970. 13 refs. (3 claims).

Exhaust gas afterburner for car engines with fresh air control as a function of the operating conditions is described. The reaction chamber is double-walled, with a fresh air inlet and outlet into the space between the inner and outer walls, and an exhaust gas inlet into the catalyst chamber. The exhaust inlet pipe is connected with the fresh air inlet through a bypass line with a bypass valve, which diverts most of the fresh air into the reaction chamber at low engine and reaction chamber temperatures, as well as at low engine load and speed, and into the jacket at high engine and reaction chamber temperatures as well as at high engine loads and speeds. The total air supply can be diverted into the jacket when certain temperatures, speeds, and loads are exceeded. The afterburner provides combustion of carbon monoxide into carbon dioxide at low speeds.

38080

APTIC NO. 60909

Nakajima, Yasuo, Yoshimasa Hayashi, and Kunihiro Sugihara
DEVICE FOR AIR POLLUTION CONTROL FOR INTERNAL COMBUSTION ENGINES. (Einrichtung zum Schutz gegen Luftverschmutzung fuer eine Brennkraftmaschine). Text in German. (Nissan Motor Co., Ltd., Yokohama (Japan)) W. Ger. Pat. Appl. 2,002,163. 9p., Jan. 19, 1970. 7 refs. (7 claims).

A device for the reduction of the nitrogen oxides emissions from internal combustion engines by controlled recirculation of the exhaust gas in the combustion chamber is described. The exhaust gas is returned into the suction pipe via a control valve to whose correcting element the suction pipe vacuum is admitted by an electric control unit that excites a solenoid valve as a function of the suction pipe vacuum and of the engine speed. The solenoid valve is excited, and consequently the suction pipe vacuum is admitted to the exhaust recirculation control valve in the vacuum range of -10 Hg mm and -350 Hg mm. The vacuum sensor, designed for the vacuum-dependent control of the solenoid excitation, constitutes a vacuum chamber and an atmospheric chamber, separated by a diaphragm, while the engine speed sensor constitutes a solenoid coil with mobile core and a pulse counter for the speed-dependent control of the exhaust gas recirculation.

38081

APTIC NO. 60997

Owens, V. P.

TENDENCIES IN THE DESIGN OF KRAFT CHEMICAL RECOVERY UNITS. (Tendencias en el diseno de unidades de recuperacion quimica en procesos kraft). Text in Spanish. Asoc. Mex. Tec. Ind. Celul. Pap. Bol., 10(5):403-410, Sept.-Oct. 1970. 6 refs.

General trends in the design of kraft chemical recovery units are illustrated by the recent developments by the Combustion Engineering, Inc., and black liquor recovery units put into

AIR POLLUTION ABSTRACTS, AUGUST 1974

operation and being planned in Mexico are described. The kraft chemical recovery units, ranging in capacities from 1,000,000 to 3,000,000 lbs of dry solids per day, generate steam at 700-825 F and under 600 to 1000 psi pressure. Increased steam temperatures and pressures are a characteristic trend in new designs. The chemical recovery unit is preceded by an electrostatic precipitator. The first-ever chemical recovery unit with integrated odor control includes an electrostatic precipitator between a direct-contact evaporator and an induced-draft fan and a Laminare type air heater for odor control. Odor control designs according to the Swedish system are also used in chemical recovery units in the kraft process.

38082

APTIC NO. 60547

Tatsutomi, Yasuo

PARALLEL- AND INNER-SHAFT ROTARY PISTON INTERNAL COMBUSTION ENGINE WITH SLIP CONTROL. (Parallel- und innenachsige Rotationskolben-Brennkraftmaschine mit Schlupf eingriff). Text in German. (Toyo Kogyo Co. Ltd., Hiroshima (Japan)) W. Ger. Pat. Appl. 2,054,427. 4p., Nov. 5, 1970. 6 refs. (2 claims).

A parallel- and inner-shaft internal combustion engine with slip control and partial exhaust gas recirculation for nitric oxide and nitrogen dioxide emission abatement is described. Partial recirculation of the exhaust gas to the inlet is secured by a connection duct between the outlet and the inlet of the engine; the duct is in the engine casing which also contains borings for cooling liquid. The control valve inserted in the connection duct is cooled by adjacent cooling borings in the engine casing to prevent clogging.

38083

APTIC NO. 60609

Welly, B. Albert, Jr.

PROCESS FOR THE REMOVAL OF SULFUR DIOXIDE FROM FLUE GAS OR WASTE GAS. (Verfahren zur Entfernung von Schwefeldioxyd aus Rauchgas oder Abgas). Text in German. (Esso Research and Engineering Co., Linden, N. J.) W. Ger. Pat. Appl. 1,963,618. 8p., July 9, 1970. 4 refs. (1 claim).

A process for the removal of sulfur dioxide from flue gases and waste gases is described. The SO₂ present in the flue gases is absorbed on a copper-containing adsorbent in a cylindrical chamber at a temperature range of 260-485 C, after which the adsorbent is regenerated with hydrogen-containing gas obtained catalytically from methane. The hydrogen present in the regeneration gas is burned to water and condensed prior to the processing of the SO₂ to concentrated sulfuric acid. The efficiencies of the process for SO₂ and sulfur trioxide are about 91% and 100%, respectively.

38084

APTIC NO. 60432

Esso Research and Engineering Co., Linden, N. J., Products Research Div.

FIRST ANNUAL REPORT ON GASOLINE COMPOSITION AND VEHICLE EXHAUST GAS POLYNUCLEAR AROMATIC CONTENT. National Air Pollution Control Administration Contract CPA-22-69-56, Coordinating Research Council-Air Pollution Research Advisory Committee Proj. CAPE-6-68, 123p., Feb. 17, 1970. 18 refs.

Several variables affecting exhaust emission of phenols and polynuclear aromatic hydrocarbons (benzo(a)pyrene and benz(a)anthracene) were examined in cyclic tests on a chassis dynamometer, using a 1966 V-8 passenger vehicle without emission controls and a 1968 passenger vehicle with engine-modification controls. Observed emission rates, per gallon of fuel burned, ranged from 116-689 mg of phenols, 26-149 micrograms of BaP, and 54-303 micrograms of BaA. Phenols emission from the emission-controlled vehicle was not significantly lower than from the non-controlled vehicle when using high-atomic (46%) fuels, but was 8-30% lower with the 12% aro-

matic fuels. Phenol emission appeared to be a linear function of fuel aromatics content and was affected very little by the presence of polynuclear aromatics; it was suppressed slightly by the presence of fuel tetraethyl lead. The 1968 emission-controlled vehicle emitted only 20-40% as much polynuclear aromatics on a given fuel as did the 1966 uncontrolled vehicle largely due to leaner carburetion in the emission-controlled vehicle. (Author summary modified)

1969

38085

APTIC NO. 60554

Bouru, Louis Leonard

GAS SCRUBBER REMOVES PARTICLES. (Vorrichtung zur Abtrennung flüssiger oder fester, in einem Gas enthaltener Partikel.) Text in German. (Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Paris (France)) W. Ger. Pat. Appl. 1,955,966. 8p., Nov. 6, 1969. (12 claims).

A gas scrubber is described in which each vane extends the whole axial length of the housing between the floor parts. The vanes have a wedge-shaped profile in a sectional view at 90 deg to the housing axis; the opposed surfaces are parallel. A guide projects into each of the individual channels and is fitted to the inner surface of the sidewall and flow part such that it is divided into an inlet section with centrifugal guidance, connected to the inlet dirty gas opening, into a constant section, into a middle section converging parallel to the housing axis, and into an outlet centripetal guidance section which diverges and is connected to the clean gas flow passages in the hollow drive shaft.

38086

APTIC NO. 60523

Hardison, Leslie Claire and William Luke Hable

DEVICE FOR BURNING WASTE GAS. (Vorrichtung zur Verbrennung von Abgas.) Text in German. (Universal Oil Products Co., Des Plaines, Ill.) W. Ger. Pat. Appl. 1,962,839. 5p., Dec. 15, 1969. 5 refs. (3 claims).

A device comprising an elongated combustion chamber and a waste gas inlet unit for the incineration of waste gases that contain the oxygen necessary for their combustion is described. The auxiliary burner is placed in the center of a flame and gas guiding device in the form of a truncated cone widening up toward the far end of the combustion chamber. The truncated cone has holes in it for the admission of the waste gas to be incinerated. The rest of the waste gas is admitted into the combustion chamber through a ring gap formed by the combustion chamber wall and the wide end of the truncated cone. The swirling motion of the waste gas inside the combustion chamber is supported by helical baffles along the combustion chamber wall. The combustion chamber is thermally insulated.

38087

APTIC NO. 60548

Karwat, Heinz, Friedrich Kuehne, and August Krus

PROCESS AND DEVICE FOR THE REMOVAL OF CARBON DIOXIDE. (Verfahren und Vorrichtung zum Entfernen von Kohlendioxid.) Text in German. (Linde AG, Wiesbaden (West Germany)) W. Ger. Pat. Appl. 1,912,339. 20p., March 11, 1969. (13 claims).

A process and device for the removal of low concentrations of carbon dioxide from gases are described. The CO₂ is absorbed by a wash liquid composed of a mixture of hydrocarbons with one to four carbon atoms, whose freezing point is lower than that of CO₂. The absorbent may also be present in gaseous form in the gas from which CO₂ is to be removed. The wash liquid is regenerated by cooling to below the solubility limit of CO₂ after which solid CO₂ is separated from the wash liquid by filtration or centrifugation.

1968

38088

APTIC NO. 10483

Alpiser, Francis M.

AIR POLLUTION FROM DISPOSAL OF JUNK AUTOS.

Air Eng., 10(11):18-22, Nov. 1968. 13 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 61st, St. Paul, June 23-27, 1968.)

Restrictions on open burning and unfavorable economics experienced by operators of auto incinerators have increased the use of fragmentizers for disposal of junk autos. The auto scrap industry in the United States historically had been dependent on open-hearth steelmaking, but the advent in 1950 of the basic oxygen furnace caused a decrease in the amount of auto scrap used per ton of finished steel. Lower market demands and improvements in steel quality have required the scrap iron industry to upgrade quality. Incineration processes for the disposal of junk autos generally comprise afterburners and water scrubbers as a secondary air pollution control method. Two large fragmentizer processes which disintegrate entire automobiles have been developed, as well as medium and small shredder processes in which stripped auto bodies are cut into small pieces and fed to a shredder. Pyrometallurgical purification of chopped auto scrap with low grade, nonmagnetic taconite ore is being studied to make a material higher and more consistent in iron content. A novel concept for dissolving stripped, whole junk autos in a molten iron bath contained in either a vertical shaft or an inclined-shaft furnace has been proposed.

1967

38089

APTIC NO. 60706

Bolt, Jay A.

THE GAS BUGGY IS HERE TO STAY. Lamp, Spring:1-5, 1967.

A review of the current state of the art of pollution control systems for gasoline-burning automobiles is presented along with the developmental status of electric means for automotive propulsion such as the battery and fuel cell. Control methods involving engine design modification and operation, evaporation control, and crankcase emission control are predicted to result in 1975 automobiles that emit only 10% of the hydrocarbons and carbon monoxide produced by uncontrolled vehicles. A method for reducing up to 85% of the oxides of nitrogen is also in the developmental stage. Devices for automobile emission control that are either in use or under development include improved air injection exhaust systems, direct flame afterburners, and the catalytic converter. Electrically-propelled vehicles are seen as promising in terms of changing patterns of urban development and future transportation needs rather than as an alternative to the pollution problem strictly.

38090

APTIC NO. 07225

Gerlach, J., K. Hochgeschwender, and F. Pawler

CONTRIBUTIONS TO THE EXTRACTION OF RARE METALS FROM FLUE DUSTS. (Beitrag zur Gewinnung seltener Metalle aus Flugstauben.) Text in German. Metall. (Berlin), 21(7):700-708, July 1967.

Three wet processes to recover rare metals from the flue dusts of a copper smelting plant were compared. In the first method the dusts were dissolved in sulfuric or hydrochloric acid and subsequently subjected to the conventional process of separation used in analytical chemistry. The method was not satisfactory especially since only about 50% of the arsenic present could be recovered. The second method involved the evaluation of three commercially available ion exchangers. The ion exchanger Bio-Rad ZP-1 extracts rare metals and cadmium very well. The high cost of the exchanger, however, is prohibi-

tive for its economical use. Best results were obtained by the solvent extraction method. In a five-stage cascade the solvents hexon (methylisobutylketone) and hydrochloric acid were used in countercurrent flow. It is shown that this method is capable of separating the rare metals and arsenic from the main metals and from each other. The process is discussed in detail and the quantitative results are plotted in six graphs. An estimate of the cost makes this method appear economically feasible for use in certain flue dusts from metallurgical plants.

38091

APTIC NO. 60526

Tamura, Zensuke and Yukio Hishinuma

PROCESS FOR THE REMOVAL OF SULFUR OXIDES FROM INDUSTRIAL WASTE GASES. (Verfahren zum Abtrennen von Schwefeloxiden aus Industrieabgasen). Text in German. (Hitachi, Ltd., Tokyo (Japan)) W. Ger. Pat. Appl. 1,794,339. 5p., Sept. 20, 1967. (1 claim).

A process for the adsorptive removal of sulfur oxides from industrial flue gases is described. The sulfur oxides present in the flue gases are adsorbed on activated carbon which is then rinsed with water for the desorption of the sulfur oxides and for regeneration. The regenerated activated carbon is then dried and returned in the adsorption process. The rinsing solution is concentrated to sulfuric acid by utilizing the waste heat of part of the flue gases.

1966

38092

APTIC NO. 60765

Benham, C. L.

THE EFFECTIVENESS OF CAUSTIC SODA IN PREVENTING THE DEVELOPMENT OF SMELL IN POULTRY DROPPINGS SLURRY PITS. Preprint, National Agricultural Advisory Service, Derby, England, Bacteriology Dept., 4p., June 27, 1966.

Laboratory experiments were made on the addition of caustic soda to poultry manure to reduce offensive odors. The pH of normal manure, the effect of caustic soda on pH, the affect of various concentrations of NaOH on the development of smell, the affect of NaOH on bacteria, and the effect of caustic soda-treated slurry on grassland were studied. Manure diluted 1:2 with water had a pH of 8.7. To alter pH to 10, 11, and 12.25, caustic soda to give a final concentrate of 0.33, 0.58, and 0.833% was added. After 8 days, only the cylinder containing 0.833% caustic soda failed to develop a strong and objectionable smell; the pH of this suspension was 12. The bacterial count of this suspension fell to 88,000/ml, with coliforms absent in 1/10 ml, compared to the control with 392,000,000/ml coliforms present in 10 to the -7th ml. After 3 days, the pH of suspensions containing 0.33 and 0.58% caustic soda did not show the expected values of 10 and 11 pH. The caustic soda-treated slurry suspensions caused no scorching when spread on grassland; re-growth of herbage continued normally. Even if the caustic soda is purchased in large quantities, the cost of the treatment is not economical.

1965

38093

APTIC NO. 60516

Herpers, Edmund-Theodor and Ernst-Alfred Walter

PRODUCTION OF REDUCING GAS CONTAINING HYDROGEN AND CARBON MONOXIDE RICH GASES FROM COKE OVEN GAS. (Verfahren zur Erzeugung eines an Wasserstoff und Kohlenstoff reichen Gases aus Kohlendestillationsgasen). Text in German. (Otto (Dr. C.) and Co. G.m.b.H., Bochum (West Germany)) W. Ger. Pat. Appl. 1,567,728. 5p., June 22, 1965. 2 refs. (2 claims).

A process for producing a reducing gas containing hydrogen and carbon monoxide by hydrogenation and steam cracking of

the coal distillation gas is described. The coke oven gas is cooled to separate condensed hydrocarbons and water. It is then compressed and catalytically hydrogenated under 1.5-30 (3-10) atm at 250-700 C (300-500 C). The hydrogen sulfide which forms is removed by usual methods before catalytic cracking in the presence of steam and an optional oxygen-containing gas at 600-1200 C. The H₂S and naphthalene hydrocarbons may be removed from the gas before hydrogenation. Other impurities, for example hydrogen cyanide, ammonia, and nitric oxide, are also decomposed and olefins removed. This speeds up the cracking reaction.

1964

38094

APTIC NO. 60545

Bennett, L. Robert and Richard L. Kline

DEVICE FOR THE SEPARATION OF DUST PARTICLES FROM A GASEOUS FLOW. (Vorrichtung zum Abscheiden von Staubteilchen aus einem Gasstrom). Text in German. (American Air Filter Co., Inc., Louisville, Ky.) W. Ger. Pat. Appl. 1,471,608. 5p., April 25, 1964. 1 ref. (5 claims).

A device for the wet type separation of dust particles from gases is described. The device is composed of an part conically widening downwards, formed by two identical baffle walls with two longitudinal gaps between them on the opposite sides for the tangential inlet of the waste gas and a liquid distributor at the top, narrow end of the cone for the tangential inlet of the wash liquid, as well as of a lower, cylindrical part with clean gas outlet. The ratio of the distances between the opposite plane walls of the cone at the narrow top and at the wide end is in a range of 1:3 to 1:6, and preferably 1:4.17. The cleaned gas in the center of the vortex is removed through an outlet pipe immersing into the cone.

1961

33095

APTIC NO. 60621

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft Sub-Committee for Small Business and Domestic Furnaces

RESTRICTING EMISSION OF DUST FROM MANUALLY OPERATED CENTRAL-HEATING BOILERS, CAPACITY 600,000 KCAL/HR AND LESS, FIRED WITH SOLID FUELS. (Staubauswurfbegrenzung Handbediente Zentralheizungskessel für feste Brennstoffe mit Leistungen bis etwa 600 000 kcal/h). VDI (Ver. Deut. Ingr.) Richtlinien, no. 2115; June 1961. 10 refs. Translated from German. Dept. of Commerce. Joint Publications Research Service, Public Health Service APTD-1481, 13p.

The technology and design of various manually operated central heating boilers running on coal, coke, peat, and wood are described. Coal-fired and coke-fired boilers produce 12-16% carbon dioxide in the flue gas, 11.3 N cu m of flue gas/kg of fuel, and dust (100-500 mg/kg fuel in coke-fired boilers and 700 mg/kg fuel in anthracite-fired boilers). Various factors influence dust formation including breezes, size of fuel grains, components of fuel, stoking of the fuel bed, grants construction, combustion air, and flues. By controlling and changing these factors, dust can be reduced or eliminated. The construction and height of chimneys can effect the dispersion of dust and other pollutants. Other ways of reducing dust emissions are mentioned.

1960

38096

APTIC NO. 60620

Anthracite-Mining Assoc., Essen (West Germany)

RESTRICTING EMISSION OF SULPHUR DIOXIDE FROM COKE OVENS AND GAS PLANTS. (Gasauswurfbegrenzung Schwefeldioxyd Kokerein und Gaswerke Koksofen (Abgase)). VDI (Ver. Deut. Ingr.) Richtlinien, no. 2110, Aug. 1960. Translated from German. Public Health Service, APTD-1480, 20p.

The air pollution from coke and gas plants is reviewed. Sulfur dioxide is emitted from coke ovens and gas plants. Various emission criteria for different pollutants emitted in coke oven gas, producer gas, blast furnace gas, methane gas, recirculated coke oven gas, and other underfeed gases are given. In the combustion of underfeed gases, during combustion of coke oven gas, 0.4-1.3 kg/ton for coke oven gas which has been partly desulfurized, 0.9-1.9 kg/ton for producer gas, traces for blast furnace gas, and 0 for methane and recirculated gas. The SO₂ emissions can be reduced by desulfurizing the coke oven gas, using sulfur-free underfeed gases for firing the coke ovens, and changing stack design.

MEASUREMENT METHODS

1974

38097

APTIC NO. 61255

Abell, Martin T. and John R. Carlberg

A SIMPLE RELIABLE METHOD FOR THE DETERMINATION OF AIRBORNE HEXAVALENT CHROMIUM. Am. Ind. Hyg. Assoc. J., 35(4):229-233, April 1974. 11 refs.

A colorimetric procedure for determining airborne mists of hexavalent chromium is described. Polyvinyl chloride membrane filters which have good long-term stability and are easily washed clean are used for sampling. The filter is washed to remove the chromium(VI), and *s*-diphenylcarbazine is added to the wash for the colorimetric determination. The method is very sensitive; using 22 mm cells with 15 ml of solution gives a sensitivity (for 1% absorption) of 0.04 micrograms of Cr(VI). The calibration curve for the procedure is linear up to 15 micrograms of Cr(VI) (1 ppm in the solution) which is about 29 micrograms of chromium oxide. Interferences from iron, copper, and nickel are negligible; and, if the absorbance is measured after 10 min from the time of adding the *s*-diphenylcarbazine, positive interference from vanadium is negligible up to a 100-fold excess. The reproducibility of the washing and analysis of the procedure as determined with spiked filters is 3% relative standard deviation.

38098

APTIC NO. 61383

Alary, Jacques, Pierre Bourbon, Paul Chovin, Claudie Delaunay, Jean Esclassan, and Jean-Claude Lepert

NEW METHOD FOR THE DETERMINATION OF NITROGEN DIOXIDE IN POLLUTED AIR, DERIVED FROM THE GRIESS-SALTZMAN METHOD. (Sur une nouvelle methode de dosage du dioxyde d'azote present dans les atmospheres polluees, derivee de la methode de Griess-Saltzman). Text in French. C.R. Acad. Sci. Paris, Ser. C., vol. 278:651-653, March 1974. 3 refs.

A new, modified version of Griess-Saltzman's method for the determination of nitrogen dioxide in polluted air is described. Nitrogen dioxide is practically quantitatively adsorbed by a filter previously impregnated with Saltzman's reagent containing triethanolamine, from which it can be desorbed within 2 wk after sampling by means of sulfanilic acid solution. The diazonium compound formed is reacted with *N*-(alpha-

naphthyl)ethylene diamine, a non-diazotizable amine, to obtain an azo dye whose optical density is measured in a photocolormeter at 550 nm. The stoichiometry of the reaction depends on the quantity of NO₂ retained on the filter.

38099

APTIC NO. 61086

Beck, R.

THE USE OF LASER TECHNIQUE IN GAS ANALYSIS. (Lasertechnik in der Gasanalyse). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 199:71-78, 1974. 9 refs.

The possible uses of various laser techniques (Raman scattering, resonance fluorescence measurement, and resonance absorption measurement) in the laboratory and for the remote detection of pollutants are discussed. Infrared lasers are suitable for the detection in the air of carbon dioxide, carbon monoxide, ozone, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, nitric oxide, nitrous oxide, ammonia, hydrofluoric acid, formaldehyde, methane, ethylene, acetylene, benzene, acetone, and acetaldehyde in the ppm to ppb range. The Raman method has relatively low sensitivity and is expensive, however, it permits the identification of unknown substances in complete spectra. Resonance fluorescence measurement with tunable laser has been applied primarily for the determination of sodium concentrations at great altitude. The resonance absorption method is by far the most sensitive method for the determination of molecular gases in the atmosphere. It is primarily used in laboratories, but also systems for remote sensing are under development.

38100

APTIC NO. 60372

Berglund, Birgitta and Ulf Berglund

MATHEMATICAL NOSE FORECASTS ODORS. (Mathematische Nase sagt Gasgeruch voraus). Text in German. Umschau Wiss. Tech., 74(8):250-251, 1974. 4 refs.

A summation principle for perceived intensity of odors was investigated for mixtures of several gas components. Results clearly showed that theoretical values calculated according to a vector model of odor interaction were in good agreement with the empirically obtained perceived intensity for all mixtures. The method requires that all major odor fractions are known and taken into account in the model. Practical relevance to problems of odorous air pollution is discussed.

38101

APTIC NO. 61087

Breuer, W.

PROCEDURES FOR THE ANALYSIS OF TRACE GASES. (Verfahren der Gasspurenanalyse). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 199:79-86, 1974.

The possibilities, limitations, sensitivity, selectivity, and errors of continuous, automatic analytical methods for the measurement of trace quantities of gases in the air are discussed. Such analytical procedures are used for the determination of critical impurity concentrations in industrial gases, for the prevention of high concentrations of toxic gases in workplaces, and in environmental protection. Instruments used for such purposes should have high selectivity and specificity with low sensitivity for other gaseous components to be able to measure gas concentrations in the ppm to ppb range. The readings should be corrected for the altitude above sea, except in instruments which measure concentration galvanically, or in which the measuring effect is proportional to the partial pressure of the trace component. Instruments adopting the wet measurement principle, e.g., instruments for the measurement of sulfur dioxide concentrations from the electric conductivity of the absorbent solution, have inherent error due to the moisture effect as a result of the evaporation of the absorbent liquid and consequently of the increased gas concentration in the latter.

38102

APTIC NO. 61085

Burkert

EXAMPLE FOR POLLUTANT CONCENTRATION MONITORING BY MEANS OF AN ON-LINE CHROMATOGRAPH. (Beispiel fuer eine Immissionsueberwachung mit einem Prozesschromatographen). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 199:101-105, 1974. 9 refs.

A gas chromatograph with a flame-ionization detector, recommended by the U. S. Environmental Protection Agency for air quality measurements, is described. The instrument is suitable for the automatic, continuous measurement of atmospheric methane, hydrocarbon, and carbon monoxide concentrations. Carbon monoxide is converted into methane by a catalytic converter using nickel as catalyst, and the hydrocarbons are oxidized by nickel oxide catalyst. Designed as a double system, the first system measures the total hydrocarbon concentration with air as carrier gas with a sensitivity of 1 ppm, while the second system constitutes a single-column stripper with hydrogen as carrier gas for the conversion of CO into CH₄.

38103

APTIC NO. 61121

Chapman, R. L.

STANDARDS FOR POLLUTION ANALYZER PERFORMANCE. Instrum. Technol., 21(4):41-42, April 1974. 11 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D. C., 1973.)

An outline and the basic plan for a prototype document containing standards for pollution analyzer performance are presented. The document includes definition for the 20 most common terms related to functional performance and to conditions of operation, transport, and storage. It also stipulates 15 statements of functional performance characteristics required to be made by the manufacturer or testing laboratory; these include: rated analytical range(s), output signal, rated ranges for sample conditions, operating error (as defined), linearity, interference errors, repeatability and drift, output noise, minimum detectable concentration, rise and fall times, warm-up time, operating period, and other characteristics. Included in the document are recommended standard values and ranges for 15 influence quantities which are divided into usage groups. The first method which has been considered is non-dispersive infrared analysis for ambient measurements and emission sources.

38104

APTIC NO. 61382

Devienne, F.-Marcel and Jean-Claude Rouston

NEW METHOD FOR THE IDENTIFICATION AND MEASUREMENT OF GASEOUS AIR POLLUTANT CONCENTRATIONS. (Nouvelle methode pur l'identification et la mesure des concentrations des gaz polluants de l'air). Text in French. C.R. Acad. Sci. Paris Ser. B., 278(10): 433-435, March 1974.

A new method for the identification and quantitative determination of gaseous air pollutants, such as carbon dioxide, carbon monoxide, and sulfur dioxide, is described. The air to be analyzed is admitted to an ion source and then the ions are directed into a collision chamber by focusing lenses, where a fraction of the ions dissociate and release energy. After filtration and passage through an electrostatic analyzer, the ions are sent to an electron multiplier coupled with picoammeter. Quantitative analysis of gas mixtures of known composition is possible due to the proportionality of the peak intensity to the ion concentration.

38105

APTIC NO. 60433

Foster, J. F., G. H. Beatty, and J. E. Howes, Jr.

INTERLABORATORY COOPERATIVE STUDY OF THE PRECISION AND ACCURACY OF THE MEASUREMENT OF TOTAL SULFATION IN THE AT-

MOSPHERE USING ASTM METHOD D 2010. FINAL REPORT. Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., American Society for Testing and Materials Data Series Publication DS 55-S2, 05-055020-17, 49p., April 1974. 6 refs.

Results are presented from an experimental study of the variability inherent in measurements of total sulfation, using American Society for Testing and Materials Method D 2010. A statistical analysis of 79 total sulfation determinations performed in accordance with the method produced the following results: the standard deviation for variations among single sulfation rate measurements by different laboratories is related to the mean sulfation rate, m , by the expression, standard deviation equals 0.0136 times the square root of m , where both variables are given in mg/sq cm-day; the mean of the combined measurements between laboratories at all sites is 0.00630 mg/sq cm-day, and the overall standard deviation is 0.00135 mg/sq cm-day; the standard deviation, sw , for variations among repeated sulfation rate measurements within laboratories is related to the mean sulfation rate, m , by the expression, sw equals 0.00504 times the square root of m , where both variables are given in mg/sq cm-day; sulfate spikes added to some candles following exposure and prior to the sulfate analysis yielded an average spike recovery of 98% based on measurements by all laboratories at all sites; the overall standard deviation of the recovery of the sulfation spikes within laboratories is 21%; and the overall standard deviation of the recovery of the sulfation spikes between laboratories is 10%. (Author summary modified)

38106

APTIC NO. 61517

Fresenius, W.

THE IMPORTANCE OF FOOD CHEMISTS FROM THE FIELD OF RESEARCH FOR THE PROTECTION OF THE ENVIRONMENT. (Die Bedeutung des Lebensmittelchemikers aus dem Forschungsbereich fuer den Umweltschutz). Text in German. Deutsche Lebensm. Rundsch., 70(1):13-15, 1974. 14 refs.

One of the tasks of food chemists has been the analysis of toxic substances in food. Based on some examples, solved and unsolved problems of sampling and analysis of trace elements and organic compounds in food and air (aflatoxins, biocides nitrosamines, polycyclic hydrocarbons) are discussed. Analyses of the sulfur dioxide concentration in air have shown that the determined concentrations depend largely on the air velocity during sampling. To date it has been difficult to eliminate odors such as nitrous gases, sulfur dioxide, hydrogen sulfide, volatile phenols, and mercaptans (which are emitted by food industries and which annoy the neighborhood greatly). Systematic experiments have shown, however, that with an aqueous ozone concentration containing 1 to 3 g ozone/cu m numerous odorous substances can be oxidized in a two-stage scrubbing process using either a 5% sulfuric acid or a 5% alkaline solution.

38107

APTIC NO. 61580

Furuta, Katsuhisa, Seihachiro Murase, and Tatsuo Baba

CONTINUOUS TYPE GAS CHROMATOGRAPHY. (Renzoku gaso kuromatogurafi). Text in Japanese. Keisoku to Seigyo (Meas. Control), 13(2): 215-222, Feb. 1974. 7 refs.

A continuous gas chromatograph is described. The sample gas is added to the column in a pulse state and a detection system records the input and output. The ratio of gas components can be estimated in order to continuously obtain analytical results. The accuracy of the results can be raised by this estimation of previously unknown parameters.

38108

APTIC NO. 60381

Gordon, Robert J.

SOLVENT SELECTION IN EXTRACTION OF AIRBORNE PARTICULATE MATTER. Atmos. Environ., 8(2):189-191, Feb. 1974. 7 refs.

Replicate samples of airborne particulate matter were extracted with 17 different solvents, and the yields of dried extract appeared strongly correlated with the solvent strength parameter, derived from liquid-solid chromatography, for cases not involving a specific chemical interaction. Solvents with strength parameter values of 0.3 or larger, e.g., benzene (0.32), were adequate for recovery of polynuclear aromatic hydrocarbons. Solvents with higher solvent strength parameter values extracted larger amounts of highly polar organics, although they also dissolved some of the most soluble inorganics. Soxhlet extraction occurred at elevated temperatures depending on the solvent boiling point, higher boiling solvents being more efficient than expected from their solvent strength values. Minor reversals in solvent strength parameter values were noted from one adsorbent to another.

38109

APTIC NO. 61103

Harmsen, Hans

SEVENTY YEARS OF AIR MONITORING AND CLEAN AIR MAINTENANCE AT BAYER AG. (70 Jahre Luftüberwachung und Luftreinhaltung bei der Bayer AG). Text in German. Umwelthygiene, 25(2):37-39, Feb. 1974.

The history and the current practice of air pollution monitoring and clean air maintenance at the Bayer AG are described. Continuous sulfur dioxide concentration measurements have been conducted since 1954 by high-sensitivity automatic instruments. An automatic air quality monitoring network with 13 sampling stations and over 40 recording instruments in the Leverkusen area continuously measures the concentrations of such air pollutants as SO₂, hydrogen sulfide, carbon monoxide, nitrous gases, carbon dioxide, hydrocarbons, and chlorine. Routine laboratory measurements of the phenol, aldehyde, aromatic amine, chloride, fluoride, and organic carbon are conducted. Visible emissions are monitored by closed-circuit television, and pollutant concentrations on the lee side of the emission sources are measured by a laboratory van. The switch from coal to fuel oil and natural gas, the use of filters, and the introduction of the Bayer double-contact sulfur acid production process have resulted in considerable reduction of the pollutant emissions for the last few years.

38110

APTIC NO. 60427

Igarashi, Takashi

AIR POLLUTION DETECTION METHODS BY LASER. (Reza ni yoru taiki osen no kenshutsu hoho). Text in Japanese. Gijutsu to Kogai (Tech. Pollut.), 4(3):28-33, May 1974.

Research on the use of laser radar for pollution detection is surveyed. The detection method is determined by a combination of the mutual reaction between light, material, atomic molecular energy transmission, and absorption wavelength bands. Air samples may be used if necessary. One example is detection of nitrogen dioxide excited by fluorescence. A photoelectron meter is applied and the fluorescence emission by NO₂ is measured. A photo-sound effect detector also utilizes samples. Polluted gas expands by absorbing laser light in the resonator, and the gas creates the same sound as the laser cycle. The sound is amplified by a resonator and is transmitted by a microphone. Suspended particulates are measured by Mie scattering laser radar; pollution gases are detected by Raman laser, fluorescence laser radar, and by absorption (a combination of long distance and Mie scattering). Raman laser radar can detect many pollutants simultaneously by one transmission, but the area of scatter cross section is limited and this method is not suitable for detecting environmental pollutant concentrations. Fluorescence laser radar has an emission cross section that is 1000 times larger than Raman scattering.

38111

APTIC NO. 60411

Imagami, Kazunari

MEASUREMENT OF SOOT. (Baijin no sokutei). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(4):35-39, April 1974.

Among the standard measurement methods designated by the Japanese Industrial Standards, the JISZ 8808, a measurement method for flue gas dusts, is an important and complex method. Flue gas is usually flowing at a considerably high speed, the temperature and humidity of the gas are both high, the composition is complex, and the dust particles have great inertia. This method comprises the measurements of temperature, water content, the static pressure of the flue gas, the atmospheric pressure, the composition of flue gas, the kinetic pressure of flue gas, the inner diameter of the suction nozzle, and dust sampling; calculations are needed for the measurement position and selection of measuring point, the quantity and quality of flue gas, the flow speed of flue gas, the flow quantity of flue gas, the isospeed suction flow quantity, dust concentration, average dust concentration, and the total dust quantity. Each of these processes is followed and explained, and tips are given.

38112

APTIC NO. 61164

Imagami, Kazushige

SELECTION OF AIR POLLUTANT MEASUREMENT EQUIPMENT. (Taiki osen bussuitsu no sokuteiki no senteiri (I)). Text in Japanese. Kogyo Kanetsu (Ind. Heating), 11(1):37-44, Jan. 1974. 5 refs.

The purpose of air pollution measurement, pollutants designated by laws and regulations, legally designated measurement methods, and measurement methods for emission sources are discussed. Emission sources and pollutants, emission analysis methods, soot and dust emission sources, and emission standards are presented in tables, and a gas sampler and a dust sampler are presented in diagrams. A filter paper dust tube combined with a Mitaka nozzle is presently being developed. An isospeed gas suction nozzle has already been developed. This device equates the pressure of flue gas and the pressure of suction gas, and measures both by double manometers.

38113

APTIC NO. 60410

Israel, Gerhard W.

A FIELD STUDY OF THE CORRELATION OF STATIC LIME PAPER SAMPLER WITH FORAGE AND CATTLE URINE. Atmos. Environ., 8(2):167-181, Feb. 1974. 30 refs.

A fluoride monitoring program was conducted by 22 monitoring stations located within a 7 km radius of an alumina reduction plant in order to examine the use of limed filter papers as a tool for estimating the accumulation of fluorides in the food chain of foraging animals and for indicating the fluoride exposure of cattle. The mean fluoride level in the excretion of cattle herds was predicted from limed paper measurements with a standard deviation of + or - 3 ppm, sufficient accuracy for estimating the chronic exposure of cattle to subacute fluoride levels; additional calculations showed the possibility of predicting average urinary fluoride level of single samples from three month average lime paper concentrations with a standard deviation of plus or minus 5 ppm. Assuming that the lime papers and the forage both absorbed mainly free gaseous fluorides, the correlation found between fluoride levels in forage and limed paper values should be generally valid in terms of a forage-lime paper conversion factor developed for the location monitored.

38114

APTIC NO. 61215

Keller, Juergen

DETERMINATION OF TRACES OF DIMETHYL SULPHATE IN THE AIR. (Bestimmung von Dimethylsulfatspuren in der Luft). Text in German. Fresenius Z. Anal. Chem., 269(3):206-208, 1974.

A method of determining dimethyl sulfate in the range of 0.05 mg/cu m resp. 0.01 ppm is described. The dimethyl sulfate is concentrated by adsorption on silica gel, extracted with acetone, reacted with 4-nitroanisole sodium salt, and determined by thin-layer chromatography. To determine the threshold limit, at least 500 l of the sample are needed. Duration of sampling is 2-2.5 hr with an air sampling rate of 3-4 l/min.

38115

APTIC NO. 61503

Kettner, H.

DYNAMIC OLFACTOMETER FOR THE MEASUREMENT OF RELATIVE ODOR INTENSITIES. (Dynamisches Olfaktometer zur Messung relativer Geruchsintensitäten). Text in German. Wasser Luft Betrieb, 18(3):165-166, 1974. 7 refs.

A new olfactometer which consists of two parallelly connected flow meters which measure the amounts of odorous air and odorless air is described. The flow meters have a throughput ranging from 10 to 350 liters/h. After passage of the flow meters the gases proceed to the mixing tube at the lower end of which six silicon rubber hoses of 30 cm length are connected for smelling the odor intensity. For sampling of the odorous air polyethylene bags are used. The odor intensity is to be determined right after sampling because the samples lose the odor through adhesion to the surface of the bags. Odorless air is produced by passing atmospheric air or room air through a 20 to 30 cm thick layer of activated coal. With the unit a reliable dilution of one to 36 can be achieved.

38116

APTIC NO. 61254

Kirkbright, G. F. and C. G. de Lima

USE OF THE SHPOL SKII EFFECT FOR THE DETERMINATION OF TRACE AMOUNTS OF POLYNUCLEAR AROMATIC HYDROCARBONS. Proc. Soc. Anal. Chem., 11(3):55-60, March 1974. 8 refs.

Use of the Shpol skii effect was studied for the determination of trace amounts of 23 polynuclear aromatic hydrocarbons in several n-paraffin solvents. The wavelength assignments for the principal quasi-linear luminescence emission spectra maxima agreed well with those made by other workers and were useful for unambiguous fingerprinting of the compounds tested at trace levels in solution. The application of the fingerprinting technique appeared limited to aromatic hydrocarbons that are soluble in n-paraffins. Quantitative use of the Shpol skii effect for trace analysis required careful calibration and use of a combined internal standard-standard additions technique for minimization of energy transfer effects, inner filter effects, and experimental variables as well as to attain acceptable precision and accuracy.

38117

APTIC NO. 61460

Kosmowski, Alfred and Hermann Dreiheller

CONTINUOUS MONITORING OF AIR DUST FOR ENVIRONMENTAL AND OCCUPATIONAL PROTECTION. (Kontinuierliche Luftstaubmessung im Umwelt- und Arbeitsschutz). Text in German. Wasser Luft Betrieb, 18(3):137-140, 1974. 10 refs.

Operation and design of two radiometric dust monitors, one for immissions and one for emissions are described. The radiometric dust monitor for immissions comprises the central unit, a pump and a recording unit. It has a measurement range of 0.005 to 11 mg/cu m. For short periods it also measures higher concentrations. The accuracy is plus or minus five %. It continuously records the mass concentration of dust. Therefore, both averages as well as immission peaks can be continuously monitored and written down. The air to be monitored is drawn through a filter band moving in steps of 3 cm where the dust is retained. The mass of dust per unit area is measured according to the principle of beta-ray-absorption. The radiometric dust monitor for emissions has a measurement range of 0.1 to 1000 mg/cu m. It measures all sizes of dusts to

less than 0.1 micron, soot and non-volatile fluids. It comprises the main analyzer, a pump, a sampling unit and a recorder. The monitor samples isokinetically and dilutes the gas sample 20 to 1. The filter band on which the dust is retained moves in steps of 4 cm through the exposure and measurement chambers.

38118

APTIC NO. 61113

Kraeft, D.

ANALYTICAL MEASUREMENT TECHNIQUES IN THE AUTOMOBILE INDUSTRY. (Analysemesstechnik in der Automobilindustrie). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 199:65-70, 1974. 29 refs.

General problems of the measurement of pollutant concentrations in automotive exhaust gases are discussed with respect to the procedure adopted in the USA. Non-dispersive infrared spectrometry is used to measure carbon monoxide and carbon dioxide, and chemiluminescence is used for the measurement of total hydrocarbons and nitrogen oxides. The emission standards for 1975/76 cars are 3.40 g/mi for CO, 0.41 g/mi for hydrocarbons, and 0.40 g/mi for nitrogen oxides. Some 100 different odorous hydrocarbons in diesel engine exhaust gases have been identified by capillary gas chromatography. Measured in the U. S. cycle, the acetaldehyde and acrolein concentrations in exhaust gases are in the respective ranges of 0.2-5.3 ppm, and 0.8-4.9 ppm. Benzo(a)pyrene and related polycyclic aromatic hydrocarbons can be determined by capillary gas chromatography or by means of packed separator columns with a flame-ionization detector. The particulate emissions from vehicles powered with leaded and non-leaded gasoline are nearly equal with 0.152 and 0.165 g/mi.

38119

APTIC NO. 61423

Kurihara, Chikara and Tomohiko Fukuda

AIR POLLUTANTS ANALYSIS METHOD FOR RUBBER INDUSTRY. (Gomu kogyo ni okeru taiki osenbutsu no bunseki hoho). Text in Japanese. Nihon Gomu Kyokai-shi (J. Soc. Rubber Ind. Jap.), 47(1):11-23, Jan. 1974. 13 refs.

A procedure for the analysis of air pollutants, particularly particulates, from rubber industry is given. The procedure consists of selection of locations for measurement, analyses of flue gases including the moisture content, measurements of temperature, static pressure, and dynamic pressure at various locations, and calculations of mass and flow rate of the flue gases. Sampling of the gas must be conducted at locations where gas flow is smooth and no accumulation of particulates occurs. The analysis of moisture content is usually carried out by using a calcium chloride tube at an absorbing rate of 0.1 l/min g with a total moisture absorption of 50 mg to 1 g. The flue gas is analyzed with an apparatus consisting of a buret tube for gas measurement, three tubes containing a carbon dioxide absorbing agent, an oxygen absorbing agent and a carbon monoxide absorbing agent, respectively, and tubes containing 22% salt water as sealing liquid.

38120

APTIC NO. 60389

Leh, Francis and Kwan M. Chan

INSTRUMENTS AND METHODS FOR DETERMINING TRACE METALS. Chem. Technol., 1974:178-182, March 1974. 73 refs.

Techniques for monitoring trace metals in air and water samples are reviewed in terms of their applicability and limitations. Atomic absorption spectroscopy provides high sensitivity for many elements although it has the limitations of allowing for simultaneous analysis of few elements, consuming the sample, and being subjectable to interference by sulfur dioxide and other combustion products. The specificity and sensitivity of gas chromatography makes it attractive for analysis of trace metals, with the ultimate success of the method relying on the availability of volatile stable-metal chelates; often the technique is employed to separate materials prior to injection

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into a mass spectrometer. The most comprehensive and versatile technique is neutron activation analysis. Its advantages include the ability to analyze 30-40 elements at very low concentrations, and it is non-destructive and can be fully automated for manpower savings. The disadvantages are its inability to determine the chemical form of a desired element, its relative slowness in obtaining results, and high cost of equipment. Electron spin resonance offers a possible way to determine paramagnetic trace metals. The ring-oven technique, a kind of spot analysis on filter paper, is generally useful in the microgram to nanogram range. The procedures are simple, and only 10-30 min are required per analysis.

38121

APTIC NO. 61551

Lippmann, Morton and Tai L. Chan

CALIBRATION OF DUAL-INLET CYCLONES FOR RESPIRABLE MASS SAMPLING. *Am. Ind. Hyg. Assoc. J.*, 35(4):189-200, April 1974. 9 refs.

Four stainless steel dual-inlet cyclones were evaluated for their suitability as precollectors in two-stage respirable dust samplers in view of the need for higher volume samplers with precollectors following the American Conference of Governmental Industrial Hygienists criteria. All of the units tested for calibration showed almost ideal characteristics for the first stage of a respirable dust sampler; and each appeared capable of closely simulating the ACGIH sampler acceptance curve at a particular flow rate, i.e., 9 l/min for a 1/2 in. Health and Safety Laboratory (Atomic Energy Commission) cyclone, 25 l/min for an Aerotec 3/4, 75 l/min for a UNICO 240, and 430 l/min for an Aerotec 2 unit. They also performed better than the most widely used cyclone precollector, the Dorr-Oliver 10 mm nylon cyclone. Despite apparently sloppy manufacturing tolerances, the cyclones of a particular design showed relatively minor fluctuations in particle collection efficiency (+ or - 4%), with the exception of one Aerotec 3/4 cyclone. The collection efficiency of the cyclones decreased with increasing dust concentration, but the deviations expected at concentrations encountered in breathing zone or ambient sampling situations should be negligible.

38122

APTIC NO. 58545

Matteson, Michael J., George F. Boscoe, and Othmar Preining
DESIGN THEORY AND CALIBRATION OF A FIELD TYPE AEROSOL SPECTROMETER. *J. Aerosol Sci.*, 5(1):71-79, Jan. 1974. 15 refs.

A cylindrical-type aerosol spectrometer, of simple, compact design, was constructed and tested. The aerosol particles are injected into a horizontal centrifugal field through two ports - a pin-hole orifice situated opposite a larger port. Aerosols moving through the larger port are removed in a cumulative size deposition on half of a foil on the outer wall, and serve as clean air for aerosols injected through the pin-hole and deposited according to discrete sizes on the other half of the foil. The instrument is based on a modification of a device developed by Hochrainer and offers the advantage of confining the aerosol deposit to a narrow streak or dot in the case of monodisperse particles. The spectrometer was calibrated with monodisperse polystyrene latex particles. The results were compared with a theoretical expression developed for sedimentation distances appropriate to aerosols flowing in the plane of rotation. The pressure drop across the exit orifice could be calculated from design variables, and, assuming that the aerosol volumetric flow rate in the annular channel was limited by the pressure drop across the exit orifice, this flow rate was obtained from orifice calibration data. Satisfactory agreement was found between theoretically predicted sedimentation distances and those from tests with aerosols of polystyrene latex. (Author abstract modified)

38126

APTIC NO. 60419

38123

Miyajima, Kunio

MEASUREMENT OF TOXIC GASES. (Yagai gasu no skoutei). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(4):26-30, April 1974.

The toxic gases discussed here are sulfur oxides, nitrogen oxides, fluorides, chlorine and hydrogen chloride. Sampling methods, sampling equipment, and analysis methods are described. The analysis methods include: iodimetric, arsenazo, chloranil acid barium, electroconductivity, and infrared gas analysis for sulfur oxides; chemical PDS (phenoldisulfonic), nitric acid ion electrode, zinc reduction (NEDA naphthyl ethylene diamine method), chemiluminescence, infrared absorption and ultraviolet absorption, and constant potential electrolysis for nitrogen oxides; ianthanum-alizarin complexon method photometry for fluorides; orthotridine method for chlorine, and thiocyanide mercury and silver nitrate methods for hydrogen chloride.

38124

APTIC NO. 61193

Musha, Soichiro

ATOMIC ABSORPTION SPECTROPHOTOMETRY ANALYSIS OF MERCURY. (Suigin no genshi kyuko bunseki). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 3(4):31-37, April 1974. 48 refs.

The chemical and physical properties of mercury are discussed. Mercury in its normal liquid state is not as toxic as it is ordinarily regarded; mercury steam in the air inhaled into the lung is difficult to eliminate completely, however. Traceable amounts remain in the saliva, perspiration, bile, gastric juice, and intestinal juice. The major part of it is excreted within several hours after inhalation, but mercury accumulation in nails, hair, and skin is difficult to remove. The half life of mercury in the human body is 70 days, and even one inhalation will take several weeks for the body's excretion balance to return to normal. The method of measuring mercury by atomic absorption spectrophotometry is discussed. The method of using chemical flame, and the newer method of using mercury steam are explained. When an air sample is analyzed by atomic absorption spectrophotometry, no pretreatment is necessary, whereas other mercury test materials mostly require pretreatments. A high frequency wave heating carbon and rod atomizer is used. The quantitation limit for the atmospheric mercury is 0.1 microgram/cu m.

APTIC NO. 61345

38125

Naoum, M. M., J. Pruzinec, J. Tolgyassy, and E. H. Klehr.

CONTRIBUTION TO THE DETERMINATION OF CARBON MONOXIDE IN AIR BY THE RADIO-RELEASE METHOD. *Radiochem. Radioanal. Lett.*, 17(1): 87-93, April 10, 1974. 9 refs.

The use of kryptonated hopcalite, palladium II chloride, iodine pentoxide, and mercury II oxide was investigated for the determination of carbon monoxide in air. Hopcalite was found to be unsuitable, since no destruction of the carrier surface occurred, and consequently no release of krypton 85 was observed. Iodine pentoxide kryptonate seemed to be inconvenient because of the difficulties in obtaining an anhydrous kryptonate. The surface of HgO kryptonate was destroyed by the reaction with CO, and Kr 85 was released. Therefore, kryptonated HgO may be suitable for the determination of CO by measuring either the released Kr 85 or the relative rest activity left on the paper. (Author conclusions modified)

38126

APTIC NO. 60872

O Keefe, Andrew E.

RECENT AND FUTURE ADVANCES IN AIR POLLUTION INSTRUMENTATION. Preprint, National Inst. of Applied Chemical Research, Paris (France), 7p., 1974. (Presented at National Institute of Applied Chemical Research, Colloquium on Atmospheric Pollution, 11th, Paris, France, May 8-10, 1974.)

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Recent and future advances in instrumentation for the continuous, real-time recording of air pollutant concentrations are examined. The ozone-ethylene reaction possesses sufficient photoefficiency for practical instrumentation and has confirmed the great advantage of using a gaseous, and thus continuously renewable, second reactant. The flame photometric detector has been recognized for its value to real-time ambient measurement needs and is presently considered the most versatile instrument available for measuring sulfur dioxide at ambient levels. Minor modification by substitution of the appropriate filter has potential utility for detection of phosphorus, selenium, arsenic, nitrogen, and other elements. Chemiluminescence developments and the demonstration of quantitative dissociation of nitrogen dioxide to nitric oxide have made the multipurpose NO-NO₂-NO_x instrument a reality. Further chemiluminescence developments, still in the laboratory stage, include the photofragment device measuring NO₂ and a similar one that sums up photochemically reactive organic species in a mixture. Fluorescence developments utilizing ultraviolet energy to induce the fluorescing of SO₂ have led to commercial instruments based on the principle. An argon-ion laser has similarly been used to stimulate fluorescence in NO₂. Research in the area of collect-and-analyze techniques is presently largely concerned with a search for solid sorbents to replace the liquid reagents commonly used in the past. Improved beta-absorption techniques appear to possess sufficient sensitivity for particle mass totaling, and simple aerodynamic separators can perform collection and discrimination by particle size. Energy-dispersive x-ray fluorescence has displayed great versatility in measuring elements above phosphorus in atomic number, and a device using a flame photometric detector and air passing through an inert Teflon filter has been built for assessment of sulfuric acid mist.

38127 APTIC NO. 61567

Ogino, Hiroshi, Takashi Araki, and Shigetaka Suzuki

BASIC STUDIES OF A CONTINUOUS MEASUREMENT METHOD FOR SULFUR COMPOUNDS USING CHEMILUMINESCENCE. (Kagaku hakko o riyō suru to kagobutsu no renzoku sokutei no kisoteki kento). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 798, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1H32.)

Some basic studies were made on the development of a chemiluminescent method for continuous measurement of sulfur compounds other than sulfur dioxide. Ozone is produced in an ozone producer, and part of it is sent into the cell, adjusting the flow rate by a capillary and a needle valve. The test gas is also led into the cell. The hydrogen sulfide concentration is adjusted by nitrogen gas. The gas in the cell is continuously discharged by an oil rotation pump. Ozone and H₂S react to produce sulfur dioxide, part of which is excited and emits light with a peak at 340 nm. The emission intensity is amplified and recorded. Since H₂S and ozone reactions produce a very weak light, the cell was heated and the pressure increased to several hundred mm Hg to help the emission. This experiment produced a sound calibration line within the H₂S concentration range of 0-108 ppm.

38128 APTIC NO. 60648

Ohsumi, Tadao, Takao Furuichi, and Kohei Yamada

IONIZATION TYPE SMOKE SENSOR. (Ionisation-srauchfuehler). Text in German. (Nittan Co. Ltd., Tokyo (Japan)), W. Ger. Pat. 2,223,360. 4p., Feb. 7, 1974. 1 ref. (Appl. May 12, 1972, 1 claim).

An ionization type smoke sensor without auxiliary heating of the radioactive source is described. The smoke sensor is composed of a reference chamber and another ionization test chamber with a radioactive source supported by thermally insulating material. The radioactive source is coated with a thin film of thermally insulating material which exposes part of the

radioactive material. Fogging due to temperature changes is prevented by the use of thermally insulating support for, and of a thermally insulating film of the radioactive source.

38129 APTIC NO. 61603

Okamoto, Masayoshi, Keiko Yamada, and Hiromi Yoshida

COMPARISON OF CHEMILUMINESCENCE METHOD AND SALTZMAN METHOD FOR MEASUREMENT OF NITROGEN OXIDES IN THE AIR. (Taikichu chisso sankabutsu sokutei ni okeru kemirumiho to Zarutsumanho no hikaku). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 692, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G37.)

Continuous measurement data of nitrogen oxides taken by the chemiluminescence method and Saltzman method were compared. The air was sampled for 5 days at 15 m above the ground, and nitric oxide and nitrogen dioxide were analyzed. The measurements for NO agreed well, but the NO₂, the Saltzman measurement was greater than the chemiluminescence measurement. For either element, when concentration was less than 2 ppm, the Saltzman measurement tended to be smaller than the chemiluminescence measurement. This was probably because the absorption rates for both NO and NO₂ in solution depend on concentration, and absorption rates were low when the concentrations were low. Correlation coefficients and regression lines are presented. The NO values by both methods show a good correlation of 0.97. The NO₂ measurements show a great difference, and this may be caused by a problem in the Saltzman method absorption coefficient or a converter problem in the chemiluminescent method.

38130 APTIC NO. 61092

Peinke, W.

OPERATION SURVEILLANCE BY MEANS OF ON-LINE ANALYZERS. (Betriebsueberwachung mit Prozessanalyatoren). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 199-13-23, 1974. 16 refs.

Possibilities of the use of analytical systems combined with data processing units for on-line process control in technology and for environmental monitoring are discussed. On-line analyzers integrated in technological control systems with computers can be used for process control, process optimization, and for the preparation of material balances for technological processes. On-line computers with analytical systems are also suitable for the surveillance of certain concentrations with respect to definite concentration threshold values. When a threshold concentration is exceeded, such systems set off alarms for the initiation of adequate counter-measures. Such systems are also suitable for the identification of individual emission sources from wind direction and wind velocity data.

38131 APTIC NO. 61114

Schaefer, W.

INFRARED ANALYZERS. (IR-Analysatoren). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 199-41-47, 1974. 14 refs.

The state of the art of the development of non-dispersive and dispersive infrared-IR analyzers designed for the determination of trace quantities of gases is surveyed. Non-dispersive IR analyzers with gas-filled detectors for the determination of carbon monoxide and hydrocarbon concentrations, have their selectivity limited by the partial overlap of the absorption bands of the test gas and of other gaseous contaminants. Non-dispersive instruments adopting the negative gas filtration have a very high background stability, while their sensitivity is highly dependent of the carrier gas, especially in the presence of water vapor in the gas to be analyzed. Presently, such instruments are not available commercially. Non-dispersive IR instruments with fluorescence sources have very low efficiency.

cy because a large proportion of the excitation energy is transformed into thermal energy. Combined with the negative filtration principle, such instruments may be used for CO testing. Dispersive IR analyzers with interference filters have lower selectivity than NDIR instruments have, and they use solid detectors, such as lead sulfide photoresistors or barium or lithium tantalate pyroelectric detectors, and they adopt the selective modulation principle.

38132

APTIC NO. 60443

Shirasawa, Tadao, Chotaro Ono, and Kazuo Hishida

MEASUREMENT TECHNIQUES. (Sokutei gijutsu). Text in Japanese. PPM (Japan), 5(5):131-158, May 1974.

Various standard methods of measuring pollutants designated by the Japanese Industrial Standards are discussed in detail with formulas and diagrams. The sulfur content in coal and petroleum fuels are measured by combustion or stabilization of sulfuric acid salt in the fuel, the oxygen method, and the radioisotope method. The ash content in solid fuel is measured by heating material to 800 C. For combustion management, measurement equipment such as a fuel property meter, a gas analyzer, a thermometer, a flowmeter, a pressure meter, a hygrometer, a liquid surface meter, a weight scale, a water quality meter, a soot meter, and an automatic control device are discussed. For measurement of soot, measurement locations, sampling holes, leak prevention, water content measurement, gas flow speed measurement, soot sampling, flue gas suction, and samplers such as dust tubes and filter papers are discussed. Sampling and analysis methods and application for toxic materials such as fluorides, chlorine, hydrogen chloride, and nitrogen oxides are discussed. The quantitation methods for cadmium and lead by atomic absorption spectrophotometry, absorption photometry, and polarograph are discussed. The methods of analyzing total sulfur oxides and sulfur dioxide by neutralization, azo, idiometric method, detectors, electroconductivity, and infrared absorption spectrophotometry are discussed.

38133

APTIC NO. 61088

Siegel, Dieter

CHEMILUMINESCENCE - A PRINCIPLE OF MEASUREMENT FOR THE DETERMINATION OF NITROGEN OXIDES CONCENTRATIONS. (Chemolumineszenz - ein Messprinzip zur Bestimmung von Stickoxid-Konzentrationen). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 199:123-127, 1974. 5 refs.

The principle of the chemiluminescent method for the continuous measurement of nitrogen oxides concentrations in stack gases, and actual concentration measurements are described. With the use of a nitrogen dioxide-nitric oxide converter, it is possible to measure the NO, NO₂, or the NO + NO₂ concentrations. The water vapor present in the stack gases to be analyzed is removed by means of a Hartmann-Braun gas cooler without condensation of nitrogen oxides. The ozone necessary for the chemiluminescent reaction is generated by electric discharge ozone generator. Chemiluminescent instruments have the advantages of being highly selective for nitrogen oxides, and of having low or no sensitivity to other contaminants. The instrument Thermo Electron Model 10 A has high accuracy and very good linearity in a measurement range of 0.1-10,000 ppm with an error of 1%.

38134

APTIC NO. 60862

Sparks, C. J., Jr. and J. C. Ogle

QUANTITATIVE TRACE ELEMENT ANALYSIS WITH X-RAY FLUORESCENCE. Preprint, Oak Ridge, National Lab. Oak Ridge, Tenn., Metals and Ceramics Div., 24p., 1974 (7). 8 refs.

Methods for using x-ray fluorescence to quantitatively determine trace elements (iron, copper, zinc, arsenic, selenium, bromine, rubidium, strontium, and lead) in samples of environ-

mental interest (fly ash, orchard leaves, coal) are presented. Monoenergetic exciting x-rays obtained by using a doubly bent hot pressed pyrolytic graphite monochromator with a standard x-ray tube and solid state detector system allow the determination of such trace elements to levels of a few ppm. Analysis of a wide variety of samples of different densities requires that the sensitive area of the detector subtend the same solid angle for the fluorescent radiation from each part of the irradiated volume of the sample. The experimental intensity data along with published values of fluorescent yields x-ray cross-sections, and scattering factors are all that are needed to perform quantitative determination. No standard samples are required. Measurement of the absorption coefficients for both the exciting and fluorescent x-rays in the sample and the background determination pose the major limitations to analysis accuracy, and the method is recommended as a first measure of quantitative concentrations when a large number of samples must be analyzed. Geometrical considerations in the design of the x-ray detection collimator system and necessary parameter measurements for the conversion of observed fluorescent intensities into quantitative units are described, and techniques are given for minimizing the errors which might arise. Sample results are given for the elements and materials listed above.

38135

APTIC NO. 61575

Sugimae, Akiyoshi and Yuzuru Matsuo

METAL COMPONENTS IN SUSPENDED PARTICULATES (REPORT NO. 14). LUMINESCENT SPECTROMETRY ANALYSIS OF METALS IN DUSTS CAPTURED ON A SILVER MEMBRANE FILTER. (Fuyu funjinchu no kinzoku seibun (Dai14po), Gin membran firutajo ni hosshu shita funjinchu no kinzoku genso no hakko bunko bunseki). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 690, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G35.)

Using a silver membrane filter, emission spectrophotometric analyses of iron, zinc, aluminum, manganese, lead, vanadium, chromium, nickel, cadmium, tin, bismuth, cobalt, and molybdenum was conducted. The air was captured at the rate of 30 l/min for 10 days, and 20-100 mg of suspended particulates were sampled on the filter. The filter was dissolved by heating with internal standard indium solution and nitric acid solution, graphite powder and hydrochloric acid were added, and silver chloride was settled. After the ordinary evaporation procedure, the residue was taken, crushed, and emission discharge was given on an anode cap electrode and graphite electrode at DCA 10 A for 60 sec, electrode gap 3 mm, and metals were quantitated. Compared to the method of ordinary evaporation solidification of silver nitrate, the evaporation gasification element analysis was easier, and the Sn ratio and sensitivity increased. Also, since AgCl acts as carrier, the discharge is very stable and the fluctuation coefficient is within 12%. No interference was noted from coexisting silicon, magnesium, calcium, sodium, and potassium.

38136

APTIC NO. 61590

Sugimae, Akiyoshi and Yuzuru Matsuo

METAL COMPONENTS IN SUSPENDED PARTICULATES (REPORT NO. 13). EMISSION SPECTROMETRY ANALYSIS OF METALS IN DUSTS CAPTURED IN A MEMBRANE. (Fuyu funjin chu no kinzoku seibun (Dai13ho), membran firutajo ni hosshu shita funjinchu no kinzoku genso no hakko bunko bunseki). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 689, 1974. (Presented at the Japan Chemical Society Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G34.)

Simultaneous quantitation of beryllium, bismuth, cadmium, chromium, copper, manganese, nickel, lead, tin, titanium, vanadium, and zinc in dusts collected on a membrane filter was successfully achieved by emission spectrometry. The

membrane filter was 47 mm in diameter, made of polyvinyl chloride with 0.8-micron pores and attached to a filter holder. The air was sampled at the rate of 30 l/min for 7 to 10 days. The filter was placed in a long range settling tube and 10 ml of acetone was added; after the filter was dissolved, dusts were centrifugally separated. The dusts were washed by acetone three times to eliminate filter residue, and the entire dusts were dried for 1 hr. Dusts were mixed with sodium fluoride and graphite powder in 1:1:1 ratio, and this was then packed in a graphite neck electrode. The electrode was heated in an electric furnace at 350 C for 1 hr to prevent powder scattering, and then the electrodes were charged and emission was created. The fluctuation coefficient was 5.9 to 13.2%.

38137

APTIC NO. 61292

Sujan, Chandur

REALTIME - OXYGEN MEASUREMENT TO CONTROL COMBUSTION PROCESSES. (Echtzeit - Sauerstoffmessungen zur Kontrolle von Verbrennungsprozessen). Text in German. Erdoel Kohle Erdgas Petrochem., 27(3):165-166, March 1974.

The most common method to check the efficiency of a combustion process is the determination of the oxygen concentration in the flue gas. A low oxygen fraction is indicative of a bad combustion process as a consequence of which carbon monoxide and soot emission rises. A high oxygen fraction leads to heat losses. An O₂ analyzer is described which requires no sampling system. It is directly inserted into the flue gas duct making a realtime analysis of the O₂ concentration in the combustion off-gas feasible. The most important component of the analyzer is a stabilized zirconium cell which produces an electric voltage through being heated to a constant temperature of 850 C. The voltage changes inversely logarithmically in dependence of the O₂ partial pressure difference in the measurement gas and the O₂ fraction of a reference gas whose composition is known. The zirconium cell is exposed on one side to the measurement gas, on the other side to the reference gas. The voltage produced by the cell is lower the lower the O₂ concentration in the measurement gas is.

38138

APTIC NO. 61605

Suzuki, Hiroshi, Chihiro Okayasu, Tsuneo Shirai, and Saburo Yanagisawa

STUDIES ON COLLECTION OF HARMFUL ATMOSPHERIC SUBSTANCES BY ACTIVATED CARBON ADSORPTION METHOD. (Taikichu yugai busshitsu no kasseitan kyuchakuho ni yoru hoshu ni kansuru kenkyu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 676, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G12.)

Experiments were conducted for collection of toxic substances in an organic solvent diffused in the air using activated carbon. Organic solvent substances do not exist in the air singly; therefore, a method of capturing several kinds of substances is necessary. The tested solvents were: methyl acetate, ethyl acetate, methylethylketone, benzene, trichlorethylene, isobutyl acetate, n-butyl acetate, toluene, m-xylene, and pyridine. Dimethylform amide (DMF) was used as an extraction medium. Activated carbon was packed in two locations of a 15-cm long glass column with silicon rubber stoppers. The test material was injected by syringe, and after leaving it for a day, DMF extraction was done and gas chromatography applied. Extraction efficiency was 30-70%, and adsorption efficiency was 70-85%.

38139

APTIC NO. 61247

Tesarova, Irena

SOME MICROANALYTICAL METHODS IN THE CHEMICAL ANALYSIS OF AEROSOLS. (Některé mikroanalytické metody k chemické analýze aerosolů). Text in Czech. Chem. Listy, 68(1):12-22, 1974. 29 refs.

106

Inorganic as well as organic materials occur in atmospheric aerosols. Aerosol samples are obtained by ultrafiltration. Among commercial filters, the best is the nucleopore filter (mean pore size 0.8 micron, lowest metal content), though the cheaper Whatman 41 filter paper is surprisingly effective. The Synpor filter was also well suited. The filters are frequently combined with cascade impactors to obtain separation of the particle sizes. The samples are then usually dissolved and subjected to appropriate microanalytical procedures, mainly neutron activation analysis, atomic absorption spectrophotometry, and x-ray fluorescence spectroscopy. Spectrophotometric methods (the electron microprobe and the ion microprobe) are used to analyze individual, sub-micron particles. In the analysis of organic aerosols, combinations of chromatography with fluorimetry and of gas chromatography with mass spectrometry have been used to determine hydrocarbon contents in the atmosphere. Test results, comparing aerosol contents of Prague with those of Cincinnati and Chicago are shown, and the recent literature (1971 - 72) is reviewed.

38140

APTIC NO. 61293

Thurauf, Walter

NEW METHODS FOR THE ELEMENTARY ANALYSIS OF COALS. (Neuere Methoden zur Elementaranalyse von Steinkohlen). Text in German. Erdoel Kohle Erdgas Petrochem., 27(3):135-138, March 1974. 27 refs.

Rapid methods for the determination of carbon, hydrogen, nitrogen, oxygen and sulfur in hard coal are described. For determination of nitrogen it is converted to its elemental state and measured with a heat conductivity measuring cell. For nitrogen, carbon, hydrogen and sulfur analyses 5 to 10 mg coal were burned in an oxygen flow. For oxygen analysis 10 to 20 mg coal were burned in a nitrogen flow. For the analysis of sulfur the coal sample is burned in a vertical combustion tube in the presence of O₂. Combustion takes place at a temperature of 1250 C. The sulfur of the hard coal is nearly 100% converted to SO₂. The relative standard deviation of the method is 3%.

38141

APTIC NO. 60413

Umezaki, Yoshimi

QUANTITATION OF HEAVY METALS. (Jukinzoku no teiryō). Text in Japanese. Kagaku Koji (Chem. Factory), 18(4):31-34, April 1974.

The toxic metals officially regulated by the Japanese Air Pollution Control Law are: cadmium and its compounds, chlorine, hydrogen chloride, fluoride and hydrogen fluoride, silica fluoride, and lead and its compounds. The maximum allowable emission standard for Cd is 1.0 mg/N cu m at all times, and lead has three standards of 10, 20, 30 mg/N cu m, depending on the types of industries. The Japanese Industrial Standard measurement methods for Cd and Pb may be by quartz fiber filter paper, glass fiber filter paper, or cellulose fiber filter paper; the solvents may be prepared by the nitric acid-chlorine method, or nitric acid-hydrogen peroxide method, nitric acid method, or low temperature burning method; analysis methods may be atomic absorption spectrophotometry, dithionite-chloroform spectrophotometry, or polarograph. A continuous measurement of flue gas metals is difficult at the present level of technique, and it is usually sampled by batches. It is difficult to obtain a representative test sample in a flue because of the uneven flow speeds and soot concentrations. Several cross section samples must be taken by the isospeed suction method. The calculation of metal concentration follows a formula. Most of metals in the test sample can be dissolved by acid, but coexisting organic substance often interferes; carbon is especially difficult to dissolve and often adsorbs heavy metals. Carbon and organic matters are dry heated. Acid and alkaline dissolving methods are described.

38142

APTIC NO. 61351

Uno, Toshio, Isama Wakisaka, and Nobuyuki Kubo

DETERMINATION OF DUST CONTENT IN BOILER FLUE GAS BY A RAPID METHOD. (Boira haigas-chu no baijinryo no jinsoku sokuteiho). Text in Japanese. Mitsui Zosen Giho (Mitsui Tech. Rev.), vol. 85:15-22, Jan. 1974. 6 refs.

A rapid method for the determination of dust content in flue gas from heavy oil burning boilers is described. The relations between the dust content obtained by the JIS measurement method and the value indicated on a smoke meter were investigated. The linear relation obtained was in the range of 0.05 to 0.2 g/N cu m dust content. Particle measurement was carried out on the basis of the relations obtained. Rapid measurement is possible within the range 0.03 to 0.25 g/N cu m dust content; measurement error against the measured value by the JIS method is about + or - 10%; and the time for the measurement is about 8 min.

38143

APTIC NO. 61208

Vitali, R., G. Perego, E. Montani, and P. Garibaldi

LEAD COMPOUNDS IN GASOLINE ENGINE EXHAUST GASES. PART 3: ELEMENTAL COMPOSITION AND CRYSTALLINE PHASES IN PARTICULATE LEAD. (Composti di piombo nei gas di scarico dei motori a benzina. III. Composizione elementare e fasi cristalline presenti nel particolato di piombo). Text in Italian. Riv. Combust., 28(2):59-63, Feb. 1974. 5 refs.

After size fractionation in an eight-stage Andersen impactor, the particulate matter from gasoline engine exhaust gases was analyzed by a non-dispersive x-ray fluorescence method to determine the analytical composition of elements with atomic numbers over 8. Relative to the distribution of lead, the chlorine and bromine contents in each fraction were analyzed semi-quantitatively. The crystalline phases were determined by x-ray analysis. The particulate matter was composed of lead, chlorine, bromine, phosphorus, calcium, zinc, copper, and probably sulfur and iron. Chlorine was associated primarily with the 5-60 micron particle fraction. The bromine to lead ratio was lowest for the 0.7-4 micron fraction. Four crystalline phases were distinguished.

38144

APTIC NO. 61105

Vnukov, A. K. and V. N. Al shevskiy

CERTAIN REGULARITIES AND IMPROVEMENT OF THE SELECTIVE SULFUR TRIOXIDE MEASUREMENT METHOD FOR FLUE GASES. (Nekotoryye zakonomernosti i usovershenstvovaniya selektivnogo metoda izmereniya SO₃ v dymovykh gazakh). Text in Russian. Izv. Vysshikh Uchebn. Zavedenii Energ. (Minsk), no. 1:140-144, 1974. 2 refs.

An improved selective sampler without a glass filter for sampling sulfur trioxide in flue gases is described. It was possible to abandon the glass filter, and thus to reduce the aerodynamic resistance, by increasing the cooling coil wall temperature from 80 C to 100 C, and the gas sample temperature 300 C. Under such conditions, no aerosol is formed, which makes the glass filter superfluous. The sampling rate is set at 0.00047 kg/sec.

38145

APTIC NO. 61122

Wolf, Philip C.

SYSTEMS FOR CONTINUOUS STACK-GAS MONITORING. Mech. Eng., 96(4):22-28, April 1974. 16 refs.

A state-of-the-art report is presented for continuous stack gas monitoring systems of the sample extraction type (point sampling and on-site analysis). Applications, measurement effects, and energy transducers employed are listed for the following analyzers: paramagnetic resonance oxygen analyzers (used mainly for oxygen); infrared absorption (used for carbon

monoxide, sulfur dioxide, carbon dioxide, and nitric oxide); visible and ultraviolet light photometers (used for nitrogen dioxide and SO₂); flame ionization detection (used for hydrocarbons); chemiluminescence (used for nitric oxides, NO₂, and oxides of nitrogen); and thermal conductivity (used mainly for hydrogen).

38146

APTIC NO. 61599

Yokohata, Akira, Kazuto Takimoto, Hiroshi Takagi, and Satoru Tsuda

ADSORPTION OF HYDROGEN SULFIDE ON THE SURFACE OF SILICA GEL TREATED BY PHOSPHORIC ACID. (Rinsan shori shita shirika geru hyomenjo e no ryuka suiso no kyuchaku). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 674, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G10.)

By the Japanese Industrial Standard regulation, the analysis of hydrogen sulfide gas requires pretreatment of sampling glass tube with phosphoric acid to prevent H₂S adsorption on the glass surface. Even with the pretreatment, however, the concentration of H₂S decreases. The effects of metals (aluminum for instance) contained in the glass was suspected of causing these effects and the adsorption mechanism on the silica gel surface was studied. Two kinds of silica gel were prepared. One was given electrodialysis before heating, and the other was not. The latter contained a trace amount of aluminum. When aluminum containing silica gel was treated with phosphoric acid and heated at 500 C for 3 hr, gamma irradiation showed a decrease of electron intensity on aluminum, suggesting that aluminum was affected by phosphoric acid.

38147

APTIC NO. 60367

Environment Agency (Japan)

ON CONTROL AND HANDLING OF MEASURING INSTRUMENTS USING HIGH-PRESSURE GAS IN AIR POLLUTION OBSERVATORIES. (Taikiosen soketeisho ni okeru koatsugasu shiyo no sokuteiki kanri toritsukai ni tsuite). Text in Japanese. Kankochō Kogaisenmon Shiryo (Public Nuisance Gaz.), 9(1):59-95, Jan. 1974.

The fundamentals of handling high-pressure gases and the use of automatic air pollution measuring instruments using high-pressure gas are discussed. The technical standards concerning storage and handling of such gases are stipulated under the High-pressure Gas Control Law. Among the measuring instruments using high-pressure gas are the carbon monoxide analyzer (non-dispersive infrared spectrometry), hydrocarbon analyzer (flame ionization detector), nitrogen oxides analyzer (chemiluminescence), ozone analyzer (chemiluminescence), peroxyacetyl nitrate analyzer (electron capture detector), and the total sulfur analyzer (flame photometric detector).

1973

38148

APTIC NO. 58575

Adachi, Fumio, Osami Mori, and Hideo Tanaka

SUSPENDED DUST ELEMENT CONCENTRATION OF EACH SIZE. (Taiki fuyu ryushi no ryushikei betsu seibun ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):533, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 260.)

To see the element distributions among suspended particulates by particle sizes, a cascade impactor was used to sample particulates by sizes, and fluorescent x-ray analysis was made. The air was sampled by a 6-stage cascade impactor at the speed of 9 l/min and 149 cu m of gas was taken. Mylar films were placed on the collection plates and particulates were captured by collision and separation. After sampling, particulates were dried and weighed; the mylar films were taken off the plates and covered by a collodion film for fluorescent analysis

in order to prevent scattering of particulates. Titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, lead, calcium, potassium, chlorine, sulfur, silicon, and aluminum were analyzed. The results are presented in graphs. Titanium, Cr, Fe, Co, Si, and Al were greater in number among large sizes, and with the decrease of diameter, the number decreased. This seems to be affected by a spattering of soil, which naturally contains great quantities of Si, Al, and Ti. V, Mn, Cu, Zn, Pb, and S showed the maximum amount between the sizes 0.8 and 1.3 micron. The reason for the distribution pattern requires more study. There was no correlation between Pb, Fe, and Mn, contrary to previous reports.

38149

APTIC NO. 61281

Anderson, Weston A.

APPARATUS FOR ANALYZING ENVIRONMENTAL GASES. (Varian Associates, Palo Alto, Calif.) U. S. Pat. 3,772,909. 9p., Nov. 20, 1973. 4 refs. (Appl. Aug. 2, 1971, 8 claims).

A chromatographic system is described which can be used in the analysis of an ambient or other gaseous medium using the gaseous medium itself, in a purified form, as the system carrier fluid. Ambient gases are continuously drawn into the system, and a semi-permeable membrane type separator is used to purify the gas for use as a carrier fluid and to simultaneously provide a source of concentrated ambient impurities, a sample quantity of which is later interjected into the carrier flow stream at the input to the column. This gas chromatographic system, unlike previous systems, allows ambient gas or air to be used as the fluid carrier medium, rather than necessitating the use of a bottled quantity of purified gas as the fluid carrier medium. (Author abstract modified)

38150

APTIC NO. 60980

Antoni, F., L. Bartfai Szabo, I. Dorogi, Zs. Erdelyszky, L. Feher, L. Kelemen, J. Kovacs, and O. Pavlik

APPLICATION OF NUCLEAR TECHNIQUES IN ENVIRONMENTAL PROTECTION. (A nukleáris technika alkalmazása a környezetvédelemben). Text in Hungarian. *Izotoptechnika*, 16(12):639-653, Dec. 1973. 29 refs.

Possible application of nuclear techniques in environmental protection in general, and in air pollution and water pollution studies in particular, are surveyed. Tracing methods, and activation analysis are the basic applications of nuclear techniques in air pollution studies. To prevent secondary radioactive air pollution, tracing methods are being increasingly replaced by or combined with activation analysis. The dynamism of air pollutants in the atmosphere, and the effects of air pollutants on plants and animals are studied by tracers containing ^{14}C , such as ethylene and 1-butane. This method is also applied to the study of smog formation. Settling dust can be measured by the absorption of beta radiation from $^{90}\text{Sr}/^{90}\text{Y}$. The transport of air pollutants can be studied by means of such isotopes as ^{18}F , ^{24}Na , ^{38}Cl , and ^{42}K . The chemical reactions of sulfur dioxide in the atmosphere are studied by means of ^{35}S tracers. Inactive tracers, such as antimony oxide, are used for the study of the origin and dispersion of pollutants from large-capacity emission sources.

38151

APTIC NO. 60564

Benson, A. L., P. L. Levins, A. A. Massucco, and J. R. Valentine

DEVELOPMENT OF A HIGH-PURITY FILTER FOR HIGH TEMPERATURE PARTICULATE SAMPLING AND ANALYSIS. Little, (Arthur D.), Inc., Cambridge, Mass., Environmental Protection Agency Contract 68-02-0585, Program Element 1AA010 Rept. EPA-650/2-73-032, 78p., Nov. 1973. 19 refs.

A high purity filter medium for measuring particulates in stack gases at 230-540 C was developed and characterized with the primary objectives of achieving sufficient purity to allow op-

timum use of the detection limits of atomic absorption and flame emission spectrometry and achieving a reproducible collection efficiency of 99% for dense particles as small as 0.5 micron. Johns-Manville Company 99.2% silica fibers were made into handsheet filters with satisfactory efficiency, temperature resistance, cost, strength, and flexibility. Almost all purity requirements for optimum AAS and FES analysis were achieved; major extractable impurities in excess of AAS and FES detection limits were lead, iron, aluminum, chromium, titanium, and zinc. Collection efficiency was measured with liquid dioctyl phthalate particles of 0.3 micron diameter, and efficiencies of 99-99.99% were achieved by using filters of various diameters. Efficiency of collection of solid, high density particles was not measured; but 99.9% DOP efficiency filters should be at least 99% efficient on such particles. The strengthened filters were insensitive to humidity, insoluble in most acids and organic solvents, and slightly alkaline (pH 9-10). (Author summary modified)

38152

APTIC NO. 60696

Bethke, George W.

DEVELOPMENT OF RANGE SQUARED AND OFF-GATING MODIFICATIONS FOR A LIDAR SYSTEM. (FINAL REPORT). General Electric Co., Philadelphia, Pa., Space Sciences Lab., Environmental Protection Agency Contract 68-02-0570, Program Element 1A1010, EPA-650/2-73-040, 51p., Sept. 1973. 3 refs.

NTIS: PB 228715/AS

Modifications of a lidar system were made to eliminate the dominant source of error in the remote measurement of smoke stack plumes and to improve data presentation of the lidar transmittance measurement. The use of a special grid-controlled photomultiplier tube and off-gating system resulted in a large reduction of the photomultiplier tube afterpulsing which was the principal problem limiting the accuracy of plume transmittance measurements. A range-correcting time-squared amplifier was also developed which permits much faster and more convenient data reduction than formerly possible. These modifications were adapted to the existing van-mounted lidar system; and the overall system accuracy was evaluated using both opaque and semi-transparent targets of known transmittance (T). The lidar system yielded lidar transmittances which were precise to ± 0.015 average, were accurate to ± 0.02 average for T greater than 0.5, and were too large for T less than 0.5. These results are to be compared with the pre-modification accuracies of ± 0.9 , -0 at T greater than 0.5, and more severely too large at T less than 0.5. (Author abstract modified)

38153

APTIC NO. 60563

Bode, J. Daniel

DEVELOPMENT OF INSTRUMENTATION FOR MEASUREMENT OF STATIONARY SOURCE ALDEHYDE, ORGANIC ACID, AND AMINE EMISSIONS. Bendix Research Labs., Southfield, Mich., Bendix Center, Environmental Protection Agency Contract 68-02-0551, Program Element No. 1A1010, Rept. 6635, EPA-650/2-73-010, 90p., Oct. 1973. 15 refs.

NTIS: PB 230884/AS

Collection and analysis techniques, analytical methods for field monitoring, prototype developments in instrumentation, and field testing are reported for the development of instrumentation to measure stationary source aldehyde, organic acid, sulfur, and amine emissions. Odor panel comparisons are also given. Laboratory experiments indicate that the MBTH aldehyde method, the ninhydrin measurement for amines, and the ferric ammonium sulfate-ortho-phenanthroline method for organic sulfur compounds (oxidized to sulfur dioxide) offer the best promise of adaptation for tape monitoring instruments. Prototype monitors, based on modification of standard, commercial hydrogen sulfide tape monitors, appear acceptable for sensitivity and reproducibility. The aldehyde monitor shows

the greatest deviations in readings because of inherent reagent-flow elution effects on color spot formation. Acceptable uniform spot formation for amine monitoring is possible using 2-methoxyethanol solvent for the amine-ninhydrin color spot formation. The addition of both reagents for the sulfur determination to the tape just prior to sampling avoids any spot formation problem in the sulfur monitor. Field testing in a rendering plant indicates that the instruments can serve as emission warning monitors for undesirable increases in odorous compound concentrations. The precision of the amine and sulfur monitors indicates their appropriateness for process control monitoring as well.

38154

APTIC NO. 68971

Bonometti, Guy and Jouve Philippe

AUTOMATIC AIR POLLUTION CONTROL AT A PETROCHEMICAL PLANT. (Contrôle automatique de la pollution atmosphérique d'un site pétrochimique). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 26(361):517-519, Dec. 1973.

The automatic sulfur dioxide monitoring network of the Lack natural gas processing plant in France is described. The sulfur content of the natural gas is removed by the Claus process, and the residual gas is incinerated to sulfur dioxide before discharge into the atmosphere. The hydrogen sulfide and SO₂ concentrations in the waste gases are 0.0005% and 0.60%, respectively. The SO₂ concentration in the air is measured automatically and the measurement data are converted into electronic signals for transmission to a computer center, along with wind speed and wind direction data for evaluation of the SO₂ readings and comparison with the standards. Concentrations in excess of the standard values for a given period of time are reported to the management for adequate decisions concerning reduction of the production capacity.

38155

APTIC NO. 68981

Boudene, C., F. Arsac, and J. Godin

DEVELOPMENT OF A METHOD FOR THE SAMPLING AND DETERMINATION OF ATMOSPHERIC INORGANIC LEAD BY FLAMELESS ATOMIC ABSORPTION TECHNIQUE. (Etablissement d'une méthode de prélèvement et de dosage du plomb minéral atmosphérique utilisant l'absorption atomique sans flamme). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D.C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1051-1061, May 1973. (Oct. 2-6.)

After air sampling on a millipore diaphragm (diameter equal to 0.45 micron), the filter is dissolved in concentrated nitric acid. The residue after evaporation to dryness is heat-treated with 1% nitric acid solution, an aliquot part of which (10 microliters) is placed in a graphite spray furnace. The simplicity of this method makes it possible to carry out a large number of routine checks with a single spectrophotometer. Its very high sensitivity also enables these checks to be conducted on short-term (1 hr) samples as well as on 24-hour samples. Finally, its good reproducibility revealed a high degree of correlation between its results and those obtained with other methods already employed in monitoring of atmospheric pollution by lead.

38156

APTIC NO. 68979

Campbell, Evan E. Patricio E. Trujillo, and Gerry Wood

DEVELOPMENT OF A MULTISTAGE TANDEM AIR SAMPLER FOR MERCURY. LASL PROJECT R-060. Los Alamos Scientific Lab., Los Alamos, N. Mex., Industrial Hygiene Group, Atomic Energy Commission Contract W-7405-ENG-36, Proj. R-060, Prog. Rept. UC-41, 12p., Nov. 1973. 4 refs.

NTIS: LA-5467-PR

The thermal desorption of organic mercurials from sampling tubes containing Carbosieve B, and the retention and removal of metallic mercury vapor from Carbosieve B were investigated in an effort to develop a multistage tandem air sampler for mercury. Techniques used in the desorption and determination of metallic mercury collected on silvered Chromosorb P were also applicable for determining organic mercurials collected on Carbosieve B. The retention of metallic mercury by Carbosieve B was less than 2% of the total mercury which passed through the Carbosieve B if the latter was purged with nitrogen gas before analysis. A study to extend the upper range of the thermal desorption-flameless atomic absorption technique for mercury analysis included shortening the optical light path, different instrumental configurations, and electronic desensitizing. A dual cell system (2 cm and 15.5 cm) made from two MAS-50 Mercury Analysis Systems was the most flexible. Pressure drops of the newly designed mercury sampling tubes for sampling both organic and metallic mercury vapors were measured and met the criteria established by the National Institute of Occupational Safety and Health for the personal sampling system. (Author abstract modified)

38157

APTIC NO. 61327

Carawell, John D., Jr. and George W. Gorman

GAS ANALYZER APPARATUS. (Gow-Mac Instrument Co., Inc., Madison, N. J. and Dept. of Health, Education, and Welfare, Washington, D. C.) U. S. Pat. 3,756,069. 7p., Sept. 4, 1973. 3 refs. (Appl. Aug. 4, 1971, 9 claims).

The accuracy of thermal conductivity gas analysis is enhanced by bubbling a sample gas and a reference gas through a common reservoir to saturate the gases at equal temperature and pressure. The saturated gases are maintained at equal pressures and at a temperature exceeding their dew points until the two gases are conveyed past filaments of a thermal conductivity detector cell. In previous thermal conductivity analyzers, a problem exists in conveying the sample and reference gases to the detector with an equal rate of flow, temperature, pressure, and moisture content so that the inequalities of those characteristics do not affect the determination of the quantity of the solute gas in the sample. This problem is solved by the new analyzer which conveys the gases at equal pressures, temperatures, and rates of flow. (Author abstract modified)

38158

APTIC NO. 61119

Dodgson, J. and W. Whittaker

THE DETERMINATION OF QUARTZ IN RESPIRABLE DUST SAMPLES BY INFRARED SPECTROPHOTOMETRY - II. THE DIRECT ANALYSIS OF QUARTZ DEPOSITED ON FILTERS. Ann. Occupational Hyg., 16(4):389-395, Dec. 1973. 2 refs.

An infrared spectrophotometric method is described for the direct analysis of quartz in respirable dusts sampled on Gelman VM-1 filters composed of polyvinyl chloride, and the reliability of the method for the analysis of coal mine dusts is assessed by comparison with a potassium bromide disc technique. Field trials at one coal mine indicate that the only serious difficulty with the direct method is that coal dusts interfere with quartz absorptions. The differences in quartz concentration between the direct and routine analyses are generally small, even though filter samples give low quartz absorbances near the limiting sensitivity of the method in several cases. The sensitivity of the direct measurements on single layers of 55 mm diameter filter is not particularly high, being 0.15 mg quartz for a 12.5 micron absorption and 0.19 mg quartz at 12.8 micron. The sensitivity may be increased, however, by a factor of about four either by using a 25 mm diameter filter to collect the sample over a smaller area or by measuring the cumulative absorbance of several filter layers. A combination of the multiple layer method of measurement and repeated absorbance measurements on different areas of the quartered filters offers a feasible compromise between speed and accuracy.

38159

APTIC NO. 61361

Duffey, Joseph G.

DUST MONITORING SYSTEM AND METHOD. (Assignee not given.) U. S. Pat. 3,772,851. 5p., Nov. 20, 1973. 3 refs. (Appl. March 24, 1972, 6 claims).

A method of and system for monitoring a gaseous effluent and treating only a portion of the effluent to remove particulates and/or gaseous contaminants to bring the total discharge effluent within permissible limits are described. The total effluent is analyzed to determine the particulate and/or the contaminated gaseous content; a control monitor, responsive to the results of the analysis, is effective to vary the proportion of effluent treated relative to the untreated portion. (Author abstract modified)

38160

APTIC NO. 58449

Endo, Yoko, Minoru Kitazume, Yoji Yoshinaga, Keiko Okamura, Masao Suzuki, Etsuo Yoneyama, Mitsugu Nakamura, and Ko-ichiro Hirano

MEASUREMENT OF NITRATE ION AND OTHER ANIONS IN SUSPENDED PARTICULATES. (Fuyu fun-jin-chu no shosan ion no sokuteiho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):448, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 182.)

When measuring nitrate ion in suspended particulate, an effective method of eliminating the interference of nitrite ion was found. The interference is approximately 10%. A solution containing less than 200 micrograms of nitrate ion is taken, and 0.5 ml of 1% sulfamin acid, 1 ml of 2,4-xylenol reagent, and 15 ml sulfuric acid are added gradually; then the solution is drastically cooled in water. The solution is moved to a Roth pipette and washed by water; the total amount is made to equal 80 ml. Ten ml of toluene is added, and the solution is shaken rapidly for 2 min; the lower layer is discarded after settling. The toluene layer is mixed with 20 ml of water, and the lower layer is discarded again. Ten ml of 0.4 N sodium hydroxide is added and shaken for 5 min, and the lower layer is filtered; absorption is measured at 435 nm by spectrophotometry, and from the calibration line, nitrate ion concentration calculated. The drastic cooling in the first stage, and the amount of 1% sulfamin acid (0.5 ml) were most effective in eliminating nitrite interference. The standard error was 2.7%.

38161

APTIC NO. 61207

Facchetti, S. and P. Garibaldi

LEAD AS A POLLUTANT. PART 2: DETERMINATION OF THE ISOTOPIC COMPOSITION: A TECHNIQUE FOR THE IDENTIFICATION OF THE SOURCES OF CONTAMINATION. (Il piombo quale inquinante. II. La determinazione della composizione isotopica: una tecnica per identificare le fonti di contaminazione). Text in Italian. Riv. Combust., 27(10):474-482, Oct. 1973. 47 refs.

The application of the determination of the isotope ratios of lead as a method for the identification of the sources of air pollution by lead is described. The lead present in rocks and ores has a different isotope ratio depending on its origin, and so have lead-containing industrial products, such as tetraalkyl lead and tetraethyl lead used as additives in gasoline. With the lead isotope ratios in leaded gasoline and other lead-containing substances known to cause air pollution, it is possible to determine the main source of lead pollution from the lead isotope ratio in polluted samples of air, soil, vegetation, and even animal organs. The differences between the isotope ratios in polluted environmental samples and original lead products, such as leaded gasoline, were often greater than the precision of the mass spectrometric measurement.

110

38162

APTIC NO. 61455

Gustavsson, Karl Axel Goran

PARTICLE SAMPLING DEVICES. (AB Bahco, Enköping (Sweden)) U. S. Pat. 3,774,442. 7p., Nov. 27, 1973. 4 refs. (Appl. Jan. 5, 1972, 9 claims).

A device for taking a sample of particles from a gas flow is described. It includes a handle carrying a front portion for insertion in the gas duct in the sampling operation, a nose portion having an inlet for the gas flow, a through flow body through which extends a diffusor shaped channel extending from the inlet opening to a screen filter coupled to the downstream end of the through flow body, and a valve including a cock inserted transversely in the diffusor channel and having an axis of rotation perpendicular to the diffusor channel and parallel to the handle. The handle carries an operating rod parallel to the valve cock rotation axis which is connected between the cock and the operating knob on the handle for varying the cock between a first position providing no resistance to the gas flow through the diffusor channel and a second position closing the diffusor channel to the gas flow. The handle supports a tube having an inlet in the diffusor channel between the inlet opening of the nose portion and the valve and an outlet providing a measure of static pressure of gas flow in the diffusor channel, and a second tube having an inlet in the front portion to the gas duct and an outlet providing a measure of static pressure in the gas duct. This invention is more reliable and does not have the disadvantages of previous samplers. (Author abstract modified)

38163

APTIC NO. 61159

Harness, I.

AIRBORNE ASBESTOS DUST EVALUATION. Ann. Occupational Hyg., 16(4):397-404, Dec. 1973. 5 refs.

Recent developments in the measurement of airborne asbestos dust by the membrane filter method (aerosol is drawn through a cellulosic membrane filter) are outlined; the possibility of using a pattern recognition system known as the Quantimet 720 image analyzer is considered for the automatic evaluation of asbestos fiber counts. Preferred filters for the method at its present stage of development are white, gridded membranes of 25 mm diameter and 0.8 micron pore size. Prime samples should be of 10-minute duration; and, if the resultant dust levels fall between 2 and 12 fibers/ml, 4-hour samples are required to assess the mean dust levels. Experiments indicate that the use of cytological fixative, previously recommended to prevent loss of the fibers from the filter after sampling, is not necessary. A problem of dust disturbance on the filter during the mounting procedure is overcome by first spreading out triacetin on the microscope slide into a pool slightly less than 25 mm in diameter. Counting can be performed with a phase contrast microscope at 500 magnification; a phase objective containing a 95% absorption phase ring increases the contrast of the asbestos fibers. An image analyzer computer using a microscopic input appears capable of reducing statistical error by counting many more fibers. Erroneous decisions made by the Quantimet counter are of the same order as those made during visual microscope counts, but the errors associated with the Quantimet count are consistent and therefore calculable.

38164

APTIC NO. 61370

Hashimoto, M. and K. Kitabayashi

THE EXAMINATION OF 10 MICRONS CUT-OFF M.V. PARTICLE SAMPLER. (10 Mikuron katto M. V. sanpura no shinku). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):587, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 308.)

A medium sampler with a capacity of 100 l/min was constructed and tested for its accuracy. The sampler consisted of two filters, one for collecting particles larger than 10 micron in

size and the other for those under 10 micron, and an orifice flow meter. Fume of lead with various particle sizes having a standard deviation of 1.3 was produced from a high-frequency heating generator and was introduced to the sampler after dilution. Particles collected on the two filters were measured and the transmissivity of the first filter was calculated. Kinetic particle diameter was also calculated by introducing diluted fume into an Andersen sampler. The transmissivity calculated from the kinetic particle diameter was consistent with that obtained from the proposed sampler. It was also found that there was no change of flow rate due to pressure loss after 24 hours operation.

38165

APTIC NO. 60848

Herget, William F.

THE APPLICATION OF ELECTRO-OPTICAL TECHNIQUES TO THE SENSING OF STATIONARY SOURCE POLLUTANTS. Preprint, American Chemical Society, Washington, D. C., American Inst. of Aeronautics and Astronautics, New York, American Meteorological Society, Boston, Mass., Dept. of Transportation, Washington, D. C., Environmental Protection Agency, Washington, D. C., Inst. of Electrical and Electronic Engineers, New York, Instrument Society of America, Pittsburgh, Pa., National Aeronautics and Space Administration, Washington, D. C., and National Oceanographic and Atmospheric Administration, Rockville, Md., 20p., 1973. 4 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D. C., Dec. 10-12, 1973.)

A review is presented on the application of electro-optical techniques to sensing of stationary source pollutants, particularly via remote optical sensing. An infrared telespectrometer system which bears the acronym ROSE (Remote Optical Sensing of Emissions) has been developed for both long-path and remote spectral characterization of various source emissions. Long-path absorption measurements have been made with path lengths of 0.5, 1.5, and 3 km to date; and remote measurements have been made at gas-fired power plants, coal-fired power plants, and oil-fired plants. Recent data on measurements from these sources are illustrated. A reasonable concentration measurement is feasible for a relatively high concentration pollutant such as sulfur dioxide with minimal water interference if the plume temperature is known independently. The greatest value of the ROSE is remote measurements is sure to be species identification, although it will be necessary to increase the spectral resolution by an order of magnitude to fully exploit this capability. Presently, spectral absorption data obtained with the ROSE system in the laboratory using the gases carbon monoxide, sulfur dioxide, and methane at known concentrations are being used as input to a computer program being designed to contain a library of spectra of various gases at several concentrations. A tabulation is given of various other electro-optical techniques currently under investigation by the Chemistry and Physics Laboratory of the Environmental Protection Agency.

38166

APTIC NO. 61521

Herrmann, G.

THE TEMPERATURE DEPENDENCE OF THE SO₂ DETERMINATION IN THE ATMOSPHERE BY THE PARAROSANILINE METHOD. (Zur Temperaturabhängigkeit der SO₂-Bestimmung in der Atmosphäre nach der Pararosanilin-Methode). Text in German. Z. Ges. Hyg. Grenzgebiete (Berlin), 19(11):791-794, 1973. 10 refs.

The temperature dependence of the extinction of the reaction product formed in the pararosaniline reaction with sulfur dioxide was studied. With increasing temperature and concentration the range of constant extinction suitable for the quantitative determination grows shorter and the subsequent extinction drop increases. The temperature coefficient is independent of the SO₂ concentration and amounts to 0.003 to 0.008 degrees for a layer thickness of 1 cm at 15 to 30 C. Diagrams are given

for the reduction of the measurement values to a reference temperature. Corrections are not needed if the measurement is taken 10 to 60 minutes after the beginning of the reaction and if the results are compared to a blank solution at the same temperature.

38167

APTIC NO. 58404

Ichiki, Katsuhiro, Tsugio Koujiya, Takakazu Sato, and Yasuo Tamaoki

DETERMINATION OF ALDEHYDES AND OLEFINS IN AIR BY GAS CHROMATOGRAPH. (Taikichu no aru-dehidorui to fuhowa tanka suiso no doji bunsekiho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):603, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 324.)

The methods for measuring oxygen containing hydrocarbons and nonsaturated hydrocarbons were examined. The appliance used was gas chromatography, and a precolumn was used to separate oxygen containing HC from HC. The method for separating HC under C₆ is described with a carrier gas flow chart. Since the samples flow in the order of boiling point, the column containing above HC C₇ will stay unchanged for a long time. A low boiling point acid HC can be measured without interference of HC.

38168

APTIC NO. 61578

Igarashi, Takashi and Hideyuki Inomata

TECHNIQUE FOR MEASURING AIR POLLUTANTS BY USE OF A LASER RADAR. (Reza, reda ni yoru taiki osen bussuitsu no sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):276, Oct. 1973. 2 refs. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 29.)

The resonance absorption laser radar is capable of continuously monitoring environmental pollution. The laser beam is refracted by mie dispersion when it contacts air pollutants, and the signal is received. The intensity ratio of the laser beam is expressed in peaks and the average concentration of pollutants can be obtained. At present, from a distance of 100 m, the average concentration of 0.1 ppm of sulfur dioxide and nitrogen dioxide can be measured. The stability of spectral laser output will determine the limits of measurement concentration, distance analyses, and the area of measurements.

38169

APTIC NO. 61344

Imagami, K., N. Kogure, and I. Tamori

DEVELOPMENT OF NEW ISOKINETIC SAMPLER BY COMPARISON BETWEEN TWO KINETIC PRESSURES. (Doatsu hikakushiki tosoku kyuin sochi no kaihat-su ni kansuru kenkyu). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 8(6):31-37, Nov. 1973. 2 refs.

The application and development of a new isokinetic sampler are described. A representative sample of dust can be obtained from a dusty gas stream if the sampling is isokinetic. This requires knowledge of the values of temperature, moisture, density, and velocity of gas prior to measuring the dust concentration. The new isokinetic sampler can directly measure dust concentration without those proceeding procedures. The sample gas in stack is drawn to the sampler so that both kinetic pressures always balance between to the traditional pilot tube settled near the sampler probe in stack and to the special pilot tube in the sampler pipe. Both pressures are compared by the inclined duplex manometers. The sampler pipe with the small pilot tube has an advantage that it can be attached to thimble paper filter holders or dust tube holders.

38170

APTIC NO. 58566

Izawa, Yasukazu, Shinzo Kitamura, Yoshishige Murakami, Hiroyasu Otani, Harumoto Ando, Hidefumi Miyashita,

Masao Saito, Akio Chikada, Kizuna Suzuki, Shotaro Nishimura, and Chiyo Yamanaka

MEASUREMENTS OF AIR POLLUTION BY LASER RADAR. (Leza, rada ni yoru taiki osen no kansoku). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):278, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 31.)

An air pollution monitoring system utilizing mie dispersion lidar on-line observation, resonance dispersion, and resonance fluorescence is being developed and the system is near completion. The system consists of a stable observation station (Osaka Univ.) and a mobile monitoring car. The data handling system flow chart is presented. Speeding of data treatment and complete automation of observation by computer program are under development. A large area air pollution phenomena will be analyzed by compilation of data from both stable and mobile sources. Studies are being made for detection of nitrogen dioxide using resonance fluorescence.

38171

APTIC NO. 61586

Kanai, M. and H. Kosaka

POLICY ON AND MEASUREMENT OF OBNOXIOUS ODOR. (Akushu no taisaku to sono sokutei). Text in Japanese. Kankyo Joho Kagaku (Environ. Inf. Sci.), 2(4):36-44, Dec. 1973.

Measurement methods for odors are reviewed. Odorimetry can measure quality, intensity, acceptability, and pervasiveness of odors. Measurement and sampling methods for methyl mercaptans, hydrogen sulfide, methyl, sulfide, ammonium, and trimethylamine are reviewed. Research into continuous and automatic methods of odor measurement should be instituted. Gas chromatography is mentioned.

38172

APTIC NO. 60425

Kato, Tatsuo, Yoshimichi Hanai, Hiroshige Kachi, and Yoshiyuki Horimoto

SURVEY RESEARCH OF CAUSE OF PHOTOCHEMICAL SMOG (REPORT 5): DETECTION OF METHYL NITRATE IN SMOG. (Kakagaku sumoggu genin no chosa kenkyu, daigoho, sumogguji ni okeru shosan mechiru no kenshutsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):574, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 297.)

The presence of acrolein in photochemical smogs coincides with the presence of methyl nitrate, which accompanies symptoms on the human body such as expansion of blood vessels, blood pressure decrease, numbness, hardening of muscles, and disorders of the circulation system. Some observations were made in measurement experiments of methyl nitrate with flame ionization detectors electrochemical detectors (ECD). In a normal air pollution condition, samples of the air were taken by direct leading of 5 ml and concentrated sampling of 100 ml. In both samples, ECD was able to detect methyl nitrate, ethyl nitrate, methyl nitrite, ethyl nitrite, propyl nitrate, and peroxyacetyl nitrate. The FID concentration analysis was given simultaneously with the hydrocarbon analysis. The FID sensitivity for methyl nitrate is not good and small amounts cannot be detected. Clear measurements are obtained about 20 times a year, between 1.2 and 78 ppb. These results were not different from ECD measurements. When the acrolein concentration was high, methyl nitrate concentration was also high. For instance, when acrolein was 109 ppb, methyl nitrate was 120 ppb, and toluene was 217 ppb.

38173

APTIC NO. 61160

Kharkover, S. V. and M. Z. Kharkover

SUCCESSIVE EXTRACTIVE-PHOTOMETRIC DETERMINATION OF COBALT, MANGANESE AND COPPER IN AIR. (Posledovatel'noye ekstraktsionno-

fotometricheskoye opredeleniye kobal'ta, margantsa i medi v atmosfernom vozdukh). Text in Russian. Gigiena i Sanit., no. 11:107-108, 1973. 3 refs.

Procedure for the successive extractive-photometric determination of copper, cobalt, and manganese in atmospheric dust samples is described. Copper is extracted with disulfide for photometric determination. Then, the total of the thiooxinates of cobalt and of other elements possibly present is extracted by means of chloroform at pH 4.0. Manganese in the aqueous phase is then extracted at pH 9.0 for photometric determination. The chloroform solution of the thiooxinates is washed with 1:1 ratio of hydrochloric acid upon which all elements but cobalt are transferred into an aqueous phase. Cobalt is determined by photometric measurement of the organic phase. The limit of detectability is 2 micrograms/10 ml for all metals.

38174

APTIC NO. 61461

Kim, Young Ho, John N. Pattison, and Kenneth W. Johnson

GAS ANALYZER. (AMBAC Industries, Inc., Garden City, N. Y.) U. S. Pat. 3,771,960. 12p., Nov. 13, 1973. 10 refs. (Appl. July 28, 1971, 12 claims).

Gaseous analyzers of the Wheatstone bridge-type are well known and generally rely on a change in the impedance of an active element in the bridge circuit in response to the presence of a gas. The change in impedance unbalances the wheatstone bridge and produces an electrical output, the magnitude of which is a function of the concentration of the gas detected. Such an analyzer can be used to detect carbon monoxide in automobile exhaust. This invention describes a catalytic combustion Wheatstone bridge-type gas analyzer for field use. It produces a mixture of gas and air by gaseous diffusion of the gas and air separately through porous walls into a reaction chamber to form the mixture, which contacts the catalytic element in the bridge circuit. The porosity of the walls is selected to permit gaseous diffusion transfer while preventing gaseous transfer into the reaction chamber by convection. The relative surface areas for diffusion of the gas sample and air were selected to provide a predetermined dilution ratio for the sample. (Author abstract modified)

38175

APTIC NO. 61331

Kimura, Kikuzi

METHOD OF SPECTRA ANALYTICAL FILTER PAPER DUST SAMPLING. (Shibata Kagaku Kikai Kogyo Kabushiki Kaisha, Tokyo (Japan)) U. S. Pat. 3,770,356. 11p., Nov. 6, 1973. 2 refs. (Appl. June 30, 1972, 9 claims).

A method of spectra analytical filter paper dust sampling is discussed. The industrial dust, soot from plant chimneys, automobile emission dust, or foundry dust is captured on a sampling filter such as a filter paper. The dust is exposed to an appropriate light of single short wavelength, and by determining the optical density, the concentration of the airborne dust can be determined using a prepared diagram showing the relationship between the airborne dust and its optical density. Alternatively, each sample of airborne dust collected on the sampling filter is exposed to a plurality of lights of different wavelengths; and then by finding the ratio of optical densities as measured by a pair of lights, the content of a specific component in the airborne dust can be determined using a prepared diagram showing the relation between the content of the specific component in the airborne dust and the ratio of optical densities. This invention is a more accurate, simpler, and faster measurement method of optical density of airborne dust than that of any conventional method. (Author abstract modified)

38176

APTIC NO. 61131

Koehler, A.

SOME PRELIMINARY RESULTS BY THE AIR MONITORING GRID OF THE DEUTSCHEN FORSCHUNG-

SGEMEINSCHAFT (GERMAN RESEARCH ORGANIZATION) CONCERNING REGIONAL POLLUTION. (Einige vorläufige Ergebnisse des Messstellennetzwerkes der Deutschen Forschungsgemeinschaft bezüglich regionaler Verschmutzung). Text in German. In: Repräsentanz luftchemischer Messungen an background-Stationen. Kommission zur Erforschung der Luftverunreinigung, Mitteilung VII, p. 55-80, 1973. 2 refs.

The air quality measurement network of the German Research Organization for the determination of air pollution has been in routine operation since 1967. The network consists of five stations set up in clean air and two stations in polluted air. The clean air stations are located in Westerland (Island of Sylt), Deuselbach (altitude 500 m above sea level), Brotjackelriegel (altitude 1000 m, Bavarian Forest), Schauinsland (altitude 1200 m) and in Waldhof in the North of the Federal Republic of Germany. The two stations in polluted air are in Gelsenkirchen and Mannheim. The 50,000 to 60,000 individual values are fed into a computer for evaluation. The average annual values for dust, sulfur, nitrogen dioxide, carbon monoxide, and sulfur dioxide are listed in a table. The relationships between city and clean air yield factors between five and 20; for CO₂, the values obtained in urban air are higher by 20 ppm than those obtained in clean air. The differences of the measured values from year to year showed no steady decline or increase of the values with time. Changes from year to year at all clean air stations seem to reflect large-scale fluctuations of the general circulation. The arithmetic mean SO₂ concentrations measured at the clean air station Westerland in the years 1967 to 1970 were 14.4 (1967), 17.0 (1968), 22.2 (1969) and 16.8 (1970) micrograms SO₂/cu m. At the station in Gelsenkirchen the arithmetic means over the same period are 190.7, 171.3, 166.2 and 188 micrograms SO₂/cu m.

38177

APTIC NO. 68767

Kondrat'yev, K. Y.

POSSIBILITY OF STUDYING ATMOSPHERIC POLLUTANTS BY MEANS OF SATELLITES. In: (American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Atmospheric Pollutants in Relation to Meteorological Conditions: A Procedure for Calculating the Atmospheric Dispersion of Pollutants and the Feasibility of Their Study by Means of Satellites). M. Y. Nuttsonson (ed.), Vol. 21, Silver Spring, Md., American Institute of Crop Ecology, 1973, p. 1-8, 8 refs. Translated from Russian. (Also: Glavnoe Upravlenie Gidrometeorologicheskoy Sluzhby Pri Sovete Menestrov SSSR, no. 9:3-9, Sept. 1970.)

A survey is presented on studies dealing with the possibility of determining the content of atmospheric pollutants such as sulfur dioxide, ozone, peroxyacetyl nitrate, carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbon compounds, ammonia, halogens, aldehydes, and aerosols based on data of spectral measurements of outgoing heat radiation obtained via satellites. Data thus far indicate that suitable efforts aimed at the development of a method based on such measurement of outgoing heat radiation in the infrared region of the spectrum should yield fruitful results. Graphical data are supplied for the change of outgoing radiation for different pollutants as a function of wavelength.

38178

APTIC NO. 68428

Luetzke, Klaus

CONTINUOUS EMISSION MONITORING WITH THE AID OF PHOTOELECTRIC DUST DENSITY MEASURING UNITS. (Zur Praxis der Emissionsdauerüberwachung mit Hilfe lichtelektrischer Staubbichtmessgeräte). Text in German. TÜE (Tech. Überwach.), 14(12):353-356, 1973. 10 refs.

Photoelectric dust measuring units emit a light beam which crosses the waste gas duct. The light extinction is continuously recorded and indicated. It depends not only on the dust con-

centration in the waste gas but also on the grain size, the absorption constants, and the calculation index of the dust particles. Therefore, the indicated values may fluctuate at constant dust concentration in the waste gas within a certain range. The fluctuation depends on the operation and the fuel used. If photoelectric units are used, the fluctuation due to operation must be determined by comparative dust measurement. The gravimetric dust concentration analysis must be performed according to VDI guideline 2066. The relationship between gravimetrically determined dust concentration and the indication on the photoelectric dust density instrument is explained by two examples. Two routine calibrations were performed in hard coal-fired boilers equipped with electrostatic precipitators. The photoelectric and gravimetric dust measuring instruments were set up far behind the electrostatic precipitator. The boilers differed by the firing system, one had a melting chamber, the other a cyclone firing system. In the case of the melting chamber, the grain size exerted great influence on the indication of the photoelectric unit. The measurement values fluctuated more widely than in the case of the cyclone firing system. In both cases, a rigid connection between extinction and gravimetric dust concentration was found.

38179

APTIC NO. 61155

Naats, I. E.

EVALUATION OF THE SIZE SPECTRUM LIMITS AND SELECTION OF WAVELENGTHS FOR THE OPTIC PROBING OF ATMOSPHERIC AEROSOLS. (Otsenka granits spektra razmerov i vybor dlin voln pri opricheskom zondirovanii atmosfernogo aerolya). Text in Russian. Opt. Spektroskopiya, 35(5):966-968, 1973. 3 refs.

A mathematical method for the determination of the upper and lower limits of the size spectrum of atmospheric aerosols, and of the wavelengths for the optic probing of such aerosols is presented. The method is also applicable to other optic characteristics measured in optically active wavelength ranges.

38180

APTIC NO. 61189

Nakazawa, Tasuji and Akira Amano

SIMPLIFIED MEASUREMENTS AND DIESEL SMOKE MEASUREMENT INSTRUMENTS. (Kani sokuteiho to kiki (Diizeru sumooku)). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 27(11):1257-1262, Nov. 1973. 16 refs.

Methods and instruments for measuring diesel engine smoke are described. Visual methods include the Ringelmann smoke chart, innovations of the smoke chart by the U.S.P.H.S. and the Saurer Co. of Switzerland, and the Bachrach scale. The use of a number of different smoke meters is described, as well as a photoelectric analyzer.

38181

APTIC NO. 61376

Oka, M., T. Nakadoi, T. Kamiura, M. Nakano, Y. Hayashi, K. Takeda, and Y. Katahira

ATMOSPHERIC CONCENTRATION OF NON-METHANE HYDROCARBONS AND ITS RELATIONS WITH OTHER AIR POLLUTANTS. (Hi mentan tankasuiso nodo to ta osenshitsu to no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):569, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973. Paper 292.)

An apparatus capable of continuous determination of total hydrocarbons (THC), methane and carbon monoxide was used for a characteristic study. A standard sample containing 22.0 ppm of THC, 13.6 ppm of CH₄ and 13.7 ppm of CO was continuously introduced into the machine and was analyzed 93 times. The highest and lowest concentrations obtained for THC, methane and CO were 22.60 and 22.00 ppm, 17.70 and 17.30 ppm, and 17.50 and 17.00 ppm, respectively. It was found that the span drift had a decreasing trend. A flame ionization detector was used for the detection. The column for

continuous CH₄ and CO separation lasted for more than two months. Field investigation of the THC, CH₄ and CO concentrations was also conducted in three areas.

38182

APTIC NO. 60417

Okita, T., I. Kifune, R. Sugai, and N. Shibutani

STUDIES OF DETERMINATION OF AMINE, AMMONIA AND N-BUTYRIC ACID, ISO-VALERIC ACID GASES USING FILTER PAPER IMPREGNATED WITH ALKALI AND OXALIC ACID. (Arukari roshi oyobi shusan roshi no yoru teikyu shibosan ryu, amin, ryu, ammonia gasu bunsekiho no kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):606, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 327.)

A gas sample containing 2 ppb to 1 ppm of n-butyric acid and iso-valeric acid was passed through a filter paper impregnated with 5% or 10% sodium hydroxide solution at a flow rate of 2 to 6 l/min. The compounds were extracted first with concentrated hydrochloric acid (36% up) and then with n-hexane. The two components were analyzed with gas chromatography at the following conditions: 3 mm by 2 m glass tube column packed with 20% TMCBA and 4% phosphoric acid on chromosorb W (60/80); carrier gas, nitrogen or helium at 50 ml/min; column temperature, 139 C; injection temperature, 250 C. More than 99% of the n-butyric acid and iso-valeric acid were recovered. Same operations were conducted for the analysis of ammonia, methylamine, and trimethylamine except that the filter paper was impregnated with 9% oxalic acid. Equally high efficiency was obtained.

38183

APTIC NO. 60704

Oren, Michael R., T. F. Parkinson, and Tom Watson, III

THE ANALYSIS OF LEAD AND SO₂ IN AMBIENT AIR BY X-RAY FLUORESCENCE. Preprint, American Nuclear Society, 8p., 1973. 1 ref. (Presented at the American Nuclear Society, Winter Meeting, San Francisco, Calif., Nov. 11-15, 1973.)

A semi-portable x-ray fluorescence spectrometer was used to measure lead in particulate matter in Glover, Missouri. A description of the instrument is given. This technique can also be used to measure sulfur dioxide in ambient air. Ten filters collected in Glover, Missouri, were analyzed; Pb concentrations of 0.6-10.5 micrograms/cu m were measured. Within 40 min, the error in Pb concentration due to counting statistics was typically + or - 1.5%. Differences between x-ray fluorescence and atomic absorption analyses were due to nonuniform distribution of Pb on the filter paper.

38184

APTIC NO. 61188

Oura, Masahiro

SIMPLIFIED ANALYSIS OF VEHICLE EXHAUST EMISSIONS. (Kani sokuteiho to kiki). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 27(11):1252-1256, Nov. 1973.

The simplified analysis method of automotive emission measurement is described along with the instruments used. The two sampling methods used in this analysis are the direct sampling method and the Constant Volume Sampling method. For carbon monoxide the two methods available are non-dispersive infrared analysis and the contact combustion method. For analysis of hydrocarbons the n-hexane NDIR method is available.

38185

APTIC NO. 61248

Paterson, M. P. and R. S. Scorer

DATA QUALITY AND THE EUROPEAN AIR CHEMISTRY NETWORK. Atmos. Environ., vol. 7:1153-1171, 1973. 3 refs.

AIR POLLUTION ABSTRACTS, AUGUST 1974

An analysis of precipitation chemistry data from the European Air Chemistry Network (EACN), designed to take monthly samples of a number of chemical species in air and precipitation, has incidentally revealed three quality control faults in the system. The faults occur at the points of collection of precipitation samples, their analysis for analysis for the chemical constituents, and the filing of data. The first problem involves the frequency of occurrence, in 5 mm increments, of monthly precipitation totals recorded; monthly precipitation is not distributed as are many other geophysical variables. The EACN has standardized on a funnel diameter which yields 1.84 l of water per 100 mm of precipitation, and a 2 l polythene bottle is the standard for sample storage. It appears that this procedure may not be adequate for exceptional conditions. The second problem is one of analytical laboratory practice and probably involves problems of calibration drift. The third fault involves the misplacement of a decimal point in recording precipitation amounts. The persistence of these faults through 15 years of operation points to the need for a data quality control program.

38186

APTIC NO. 60983

Prokhorov, A. A., I. S. Novikova, I. V. Pervukhina, and I. K. Ryzhova

DETERMINATION OF DIESEL ENGINE EXHAUST-GENERATED AIR POLLUTION IN THE OPERATOR'S CABIN IN DIESEL LOCOMOTIVES. (Opredeleniye zagryazneniya vozdukh v kabine lokomotiva produktami vykhlopnykh gazov dizelya). Text in Russian. Gigiena i Sanit., no. 11:66-69, 1973.

Method for the concentration, separation, and chromatographic determination of diesel engine exhaust components in the operator's cabin of diesel locomotives is described. Sampling and concentration of the exhaust components, both organic and inorganic, is done at -78 C on chromium spheres with a liquid phase for the concentration of the organic phase, and on activated carbon for the concentration of the inorganic phase. Sulfur dioxide, acetaldehyde, propane, n-butane, acetone, and n-hexane are then separated on chromatograph by means of squalane, while nitrogen oxides, carbon monoxide, and carbon dioxide are separated on activated carbon. Identification of the exhaust gas components is possible by two chromatographic methods: by comparing the retention of reference standards with that of the actual exhaust gas components, using polyethylene glycol, squalane, and dibutyl phthalate as stationary phases, or by exploiting the dependence of the logarithms of the retention values of the number of carbon atoms in the homologous series, in identifying the groups of compounds by means of qualitative chemical reactions for aldehydes, ketones, aromatic and unsaturated hydrocarbons, alcohols, and for SO₂. Actual analyses of air samples taken from diesel locomotive operator cabins revealed no CO and NO_x. Except for the benzene, aldehyde, and SO₂ concentrations, those of other pollutants were below the maximum allowable levels.

38187

APTIC NO. 60503

Robinson, J. W.

THE DIRECT, REAL TIME DETERMINATION OF LEAD IN THE ATMOSPHERE. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1099-1105, May 1973. 10 refs. (Oct. 2-6.)

The current ambient air lead analytical methods involve passing large volumes of air over a collecting agent, transportation to the laboratory, and finally analysis. The analytical errors include inefficient collection, poor recovery in the laboratory, and contamination. The lapse time ranges from hours to days. An atomic absorption technique using a carbon atomizer capable of analyzing ambient air immediately is described. No

collection or concentration step is involved. Analytical sensitivity of 0.16 micrograms/cu m. This method is applicable to a wide variety of metals including mercury, arsenic, and cadmium. (Author summary modified)

38188

APTIC NO. 61133

Roenicke, G.

COMPLETION AND DEVELOPMENT OF THE EUROPEAN GRID OF BACKGROUND STATIONS. (Ausbau und Entwicklung des Europäischen Netzes von Background Stationen). Text in German. In: Repräsentanz luftchemischer Messungen an Background-Stationen. Kommission zur Erforschung der Luftverunreinigung. Mitteilung VII, p. 92-113, 1973. 1 ref.

Twelve European nations declared themselves ready to participate in the European measurement grid of background stations. To date only Sweden, Great Britain, Belgium, and the Federal Republic of Germany have such stations in operation. Apart from Sweden, which takes the samples in thermo-insulated boxes outdoors, all other countries take the samples in buildings sampling atmospheric air with PVC hoses. They are heated in the stations of the Federal Republic of Germany. All countries have a filter preceding the scrubber with the exception of the stations in the Federal Republic of Germany. As acid hydrogen peroxide solution is mostly used as an absorbent, with the exception of the stations in Germany which use an alkaline H₂O₂ solution. The throughput at the German stations is 1 cu m/d, at all other stations 2 cu m/d. For analysis, England, Belgium, and Sweden use titration and determine the color intensity of a thiorine indicator by photometry. The Federal Republic of Germany uses titration and determine the measurement value by turbidimetry. English and Belgian stations measure soot and dust by the reflection method, the German and Swedish stations by gravimetry. Measurement values for these pollutants are listed in a table. First measurement values for sulfur are also listed in a table. The measurement values of the German stations are comparable with those of Raec, Sweden, and with those of English and Belgian stations to a limited extent. Preliminary data yielded lowest sulfur concentrations of 1 microgram S/cu m in Eskdalemuir and Lerwick (Great Britain), 1.4 micrograms S/cu m in Bredkalen, Sweden and 4 micrograms S/cu m in Schauinsland and Deuselbach, Federal Republic of Germany.

38189

APTIC NO. 60504

Sansoni, B., W. Kracke, F. Dietl, and J. Fischer

MICROSCOPIC DETERMINATION OF LEAD IN DIFFERENT ENVIRONMENTAL SAMPLES BY FLAMELESS ATOMIC ABSORPTION FOLLOWING EXTERNAL WET INCINERATION WITH H₂O₂/Fe²⁺. (Mikrospurenbestimmung von Blei in verschiedenartigen Umweltproben durch flammenlose Atomabsorption nach externer Naasveraschung mit H₂O₂/Fe²⁺). Text in German. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1107-1116, May 1973. 13 refs. (Oct. 2-6.)

Traces of lead in various environmental samples were determined using flameless atomic absorption spectrophotometry in a graphite tube of the Marsmann type. The detection and initial weight of samples were 100-1000 times lower than in normal atomic absorption flame spectrophotometry: for example in a 20 microliter pure solution 10 to 1.10 to the -11th g Pb. Biological material with about 10 ppb of Pb was wet-ashed with hydrogen peroxide/iron(2+); the Pb enriched by precipitation with ammonia, separated, and determined in 20 microliter nitric acid solution. Careful observance of modern trace analysis techniques and yield checks at all stages in the chemical analysis procedure, using radioactive lead -212, caused high accuracy and good reproducibility. In this way, the sample quantity required for the determination of lead was reduced to

0.2-0.3 g of blood and 40 l of air. This facilitated simple, repeated, and reliable routine determinations of lead in a larger group of subjects and short-time readings of the time-dependent variations of the air lead content. As examples, the lead content of the air and its aerosols, of vegetation from areas close to and remote from traffic, of the flesh and organs of normal and intoxicated cattle, and in particular, of the blood of normal persons, point-duty police, and motor industry workers was determined in the years 1971/1972 in the Munich area.

38190

APTIC NO. 60928

Seeley, James Lewis

SPECTROSCOPIC METHODS OF TRACE ANALYSIS.

Colorado State Univ., Fort Collins, Dept. of Analytical Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 73-29,060, March 1973, 140p. 71 refs.

An air sampling device was devised which utilizes an unusually clean filter substrate material. This system, which uses spectroscopically pure deep-cup graphite electrodes as the filter medium, efficiently collects the particulate (and perhaps some gaseous) air contaminants. A unique emission spectrographic analysis method for the simultaneous determination of a number of trace elements on each filter collection was developed in which the collection electrodes are analyzed directly with minimal sample handling and/or preparation. A variety of elements of environmental interest can be simultaneously determined at low absolute levels on the order of a nanogram or less with typical accuracy and precision of + or - 10-20% of the amount present. The method was compared with other sampling methods, and a field experiment was performed demonstrating the applicability of the system to a study of particulates in city streets. Sampling time was minimal with a high degree of correlation exhibited between the test data and traffic flow. All data was based on a sample of less than 0.1 cu m of air. Elements detected included aluminum, chromium, iron, sodium, silicon, vanadium, calcium, copper, magnesium, lead, titanium, and zinc. The analytical system was also used to analyze solution residues during analysis of metals, alloys, and biological materials using a single set of calibration curves. Emission spectrographic and atomic absorption spectrophotometric methods were used to determine lead in soil. (Author abstract modified)

38191

APTIC NO. 60502

Shendrikar, A. D.

DEVELOPMENT OF AN ANALYTICAL METHOD FOR THE DETERMINATION OF LEAD IN AIR USING THE RING OVEN TECHNIQUE. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUP 5004 d-e-f, p. 1063-1070, May 1973. 13 refs. (Oct. 2-6.)

An analytical method for the determination of trace quantities of lead using the ring oven technique is presented. Lead can be detected down to 0.04 micrograms using this method; however, the recommended range for quantitative work is 0.05-1.0 micrograms of Pb. The method is ideal for determining Pb in air because it is simple, sensitive, rapid, and free from interferences that are of any significance in air pollution studies. Mexican air samples were analyzed for Pb simultaneously using this method and atomic absorption spectrometry. The data thus compared shows fairly good agreement between the two techniques. This method is especially recommended for air pollution field studies. (Author summary)

38192

APTIC NO. 60439

Shimada, Takenori, Yoshinori Katagiri, Shozo Fukui, and Saburo Sugano

STUDY ON PRACTICAL USE OF ION ELECTRODE METHOD (7TH REPORT) - QUANTITATIVE DETERMINATION OF NOX BY NITRATE ION ELECTRODE METHOD. (Ion denkyokuho no jitsuyoku ni kansuru kenkyu (Dai 7-ho) - Shosan ion denkyokuho ni yoru NOx no teiryō). Text in Japanese. Preprint, Japan Society for Safety Engineering, Tokyo, p. 97-98, 1973. (Presented at the Safety Engineering Studies Presentation Meeting, 6th, Tokyo, Japan, Dec. 6-7, 1973, Paper 27.)

An accurate yet simple analysis method for nitrogen oxides in exhaust gases is described. The NOx in the exhaust gas is instantaneously oxidized with ozone and then absorbed by hydrogen peroxide and water to produce nitric acid ions which will be measured by a nitrate electrode to obtain the NOx value. The absorbent is an 0.03% H₂O₂ solution of 0.002N sulfuric acid. Using a 200-ml syringe, 150 ml of the sample is taken from the bypass channel of the sampler. The test solution is prepared by injecting 25 ml of the absorbent into the syringe, shaking, placing it in 30 ml of oxygen containing 1% ozone. Twenty ml of the solution is mixed with 5 ml of the standard 2.5 ppm nitric nitrogen solution. A blank test solution is prepared likewise. The nitrate ion electrode and reference electrode are dipped in it. After stirring the solution with a magnetic rod until readings of electric potential became stabilized, the readings of potential and concentrations of the nitric nitrogen are logarithmically plotted on a graph to produce the calibration curve. Both the test solution and blank test solution are similarly measured to obtain values of the potential, from which nitric nitrogen concentrations for both the test solutions can be derived. Based on these values, the NOx of a given sample can be mathematically calculated.

38193

APTIC NO. 61120

Simon, Conrad

EPA-VIEW OF STATIONARY AND MOBILE NOX-SOURCE CONTROL. J. Environ. Syst., 3(4):287-300, Winter 1973. 1 ref.

The recent evolution of the Environmental Protection Agency's stand on stationary and mobile nitrogen oxide control is examined in terms of established air quality bases and the adoption of standard analytical methodology and measurement techniques. Differences in air quality data obtained from the Saltzman and Jacobs-Hochheiser methods for measurement of nitric oxide and nitrogen dioxide led the EPA to an examination of its reference method reliability and resulted in replacement of the Jacobs-Hochheiser method by the Christie method. The declassification of 45 out of 47 previously defined Priority I air quality control regions, Los Angeles and Chicago being the exceptions are resulted. The findings are discussed in terms of control strategies for stationary sources in implementation plans, a control strategy to provide for maintenance and growth, and the effect of the new data on the national standard. Enforcement policies regarding NOx standards are also outlined.

38194

APTIC NO. 60638

Strange, John Philip, Ray Secondo Freilino, and Paul Willis McCounnaughey

DETERMINATION OF CRYSTALLINE SILICA IN INSPIRATORY AIR. (Verfahren zur Bestimmung von kristallinen, in einem Gas suspendierten mineralischen Partikeln). Text in German. (Mine Safety Appliances Co., Pittsburgh, Pa.) W. Ger. Pat. Appl. 2,235,970. 17p., Feb. 8, 1973. (5 claims).

Method for the sampling and infrared spectrophotometric determination of crystalline silica in gases in general, and in air in the respiratory zone in particular, is described. Particles larger than 10 micron are eliminated, and the respirable dust

fraction is sampled on a membrane filter which is transparent for IR rays. The dust collected on the membrane filter is placed in a double-beam IR spectrophotometer, and the silica content is determined by the double peak at 12.52 and 12.82 micron, using intact, identical membrane filters as references. Calcium carbonate and coal dust did not interfere with the determination.

38195

APTIC NO. 60488

Streiff, M. L. and C. B. Ludwig

REMOTE SENSING OF AIR POLLUTION IN URBAN AREAS. General Dynamics, San Diego, Calif., Convair Aerospace Div., Environmental Protection Agency Contract 68-02-0020, Program Element 1A1010, Rept. EPA-650/2-73-026, 169p., Aug. 1973. 6 refs.

NTIS: PB 230885/AS

Remote optical sensing of air pollutant emissions in the Los Angeles area with a scanning spectrometer (ROSE system) was examined for transmission measurements over nominal path lengths of 1 and 2 mi and for stack emission measurements. Ozone and carbon monoxide concentrations were determined as a function of time, and the presence of pollutants such as nitrogen dioxide, sulfur dioxide, and several hydrocarbons was indicated. Stack emission measurements identified the presence of such pollutants as carbon monoxide, sulfur dioxide, and hydrocarbons. Transmission measurements taken during hot days were influenced by scintillation noise, but much less than anticipated. Typically, a signal-to-peak-to-peak-noise ratio of 26 observed during a test at night was reduced to about 9 during testing on a hot day. Signal fluctuations during stack emission measurements were less than anticipated, assuming the field of view was smaller than the plume. The field ruggedness and operation performance of the ROSE system proved to be satisfactory. (Author summary modified)

38196

APTIC NO. 61264

Sukhorukov, O. A., N. M. Vatulya, and V. V. Zharov

CHROMATOGRAPHIC ANALYSIS OF TRACE QUANTITIES BY PRELIMINARY CONCENTRATION FROM THE AIR OF DWELLINGS. (Khromatograficheskii analiz mikroprimesei s predvaritel'nyim kontsentrirvaniyem iz vozdukh zhiykh pomescheniy). Text in Russian. Gigiena i Sanit., no. 11:70-72, 1973. 4 refs.

A method for the two-stage sampling and concentration, and for the chromatographic determination of trace quantities of air pollutants in dwellings is described. Air is sampled at a rate of 240 ± or - 4 l/min for 6 to 8 hr through a set of series-connected traps. The first three are empty, the fourth is filled with silica gel with large pores, and the fifth trap is filled with activated carbon for the adsorption of methane and ethane. The first trap is maintained at zero C, while all other traps are cooled at -72 C. Desorption is done at 120 C for the empty traps, and at 200 C for the silica gel-filled traps. Chromatographic analysis is done by means of flame-ionization detector. The sensitivity of the analytical method amounts to 0.000001-0.0000001 mg/l. Benzene, toluene, o-xylene, ethyl benzene, n-heptane, n-hexane, n-pentane, n-octane, n-nonane, n-decane, acetone, acetaldehyde, propione aldehyde, methanol, ethanol, n-propanol, n-butanol, butanol-2, isobutanol, n-amyl alcohol, diethyl ether, diisopropyl ether, ethyl acetate, butyl acetate, amyl acetate, dioxane, dichloroethane, formic acid, acetic acid, and sebacic acid were identified in the air of dwellings.

38197

APTIC NO. 60553

Teller, Aaron J.

GAS SEPARATION FROM MIXTURES BY CHROMATOGRAPHIC VAPOUR-PHASE TECHNIQUE. (Verfahren zur chromatographischen Dampfphasenabtrennung einer oder mehrerer Komponenten eines Gasgemisches). Text in German. (Teller Environmental Systems, Inc., New York)

W. Ger. Pat. 1,619,928. 7p., Feb. 22, 1973. (Appl. Nov. 15, 1967, 2 claims).

One or more components of a gas mixture are separate rapidly, selectively, and efficiently without the need for dilution, by passage through a bed of carrier material such as alumina, coated with a layer of 0.5-5 (1-2) molecules of a reagent which absorbs these components. The resulting complex is heated above the decomposition point to free the absorbed gases. Recommended absorption layer compounds are carbonates of sodium, potassium, lithium, calcium, cadmium, or barium for carbon dioxide; nicotinic acid or dimethylglyoxime for oxygen; iron(II) salts for nitric oxide; copper(II)-ammonium salts for carbon dioxide; sulfates of potassium, sodium, lithium, cadmium, or silver, or phenol, hydroquinone, or pyrogallol for sulfur dioxide, silicon tetrafluoride, hydrogen fluoride, hydrogen sulfide, or aromatic hydrocarbons.

38198

APTIC NO. 61170

Tomingas, Rene and Arthur Brockhaus

APPLICATION OF THE SUBLIMATION METHOD FOR THE DETERMINATION OF BENZO(A)PYRENE IN URBAN AEROSOLS. (Anwendung der Sublimationsmethode bei der Bestimmung von Benzo(a)pyren in Grossstadtaerosolen). Text in German. Staub, Reinhaltung Luft, 33(12):481-483, 1973. 8 refs.

Glass fiber filters were used for collecting air samples at certain points within the city of Duesseldorf. Air was drawn through the filters for 20 to 24 hours. The pump drew on 3 cu m/hr. The samples were taken in the winter months. Some of the filters were sublimated and some extracted with cyclohexane. Sublimate and extract were analyzed by thin-layer chromatography. The sublimation method was found to meet all demands up to a benzo(a)pyrene concentration of 200 ng/filter. One advantage of the sublimation method is that it takes only 30 minutes while the extraction method takes 8 hours.

38199

APTIC NO. 61221

Tsuji, Masahiko, Tetsuhiko Yoshimura, and Toshihide Okuno. GAS-CHROMATOGRAPHY OF SULFUR COMPOUNDS PRESENT IN MINUTE QUANTITIES IN AIR. (Taiki-chu biryo io kagobutsu no gasu kuromatogurati). Text in Japanese. Hyogen-ken Kogai Kenkyusho Hokoku (Rep. Environ. Sci. Inst. Hyogo Prefect.), no. 5:57-58, Dec. 1973. 3 refs.

The official Japanese Bureau of Environment procedure for analysis of samples of hydrogen sulfide, methyl mercaptan, and methyl sulfide dictates that analysis be made within one hour after collection by gas chromatography (with a flame photometric detector). Since the method has several shortcomings, however, inspection was made of the stability of samples, the preparation of calibration curves, and the conditions of chromatography. Recent improvements in the flame photometric detector have increased detection limits to the order of ppb. For the separation of organic sulfur compounds TCP 20% Cellite 545, 60-80 mesh, 2 m, was used at 80 C. A glass condensation U tube, 8 mm i.d., filled with 25 g of glass beads was used and the chromatograph was the Yanagimoto brand. When 800 ppm hydrogen sulfide was kept for hours, the amount of residual H₂S rapidly decreased until none was detected after 24 hours. When 10 ppm benzene solutions of methyl mercaptan and methyl sulfide were stored they also decreased rapidly in concentration to residual values of 40 and 10% respectively after 48 hours. The separation of hydrogen sulfide from carbonyl sulfide was satisfactory when silica gel and TCP columns were used.

38200

APTIC NO. 61244

Tsuruta, Minoru, Kojiro Ogiwara, and Seiji Fujita

STUDIES ON THE PBO₂ METHOD OF MEASURING SULPHUR OXIDES IN AIR POLLUTION. (Nisankaen ni yoru taikichu iwosankabutsu sokuteiho no kento). Text in

Japanese. Akita Kogyo Koto Senmon Gakko Kenkyu Kiyo (Res. Rept. Akita Tech. Coll.), no. 8:71-76, Feb. 1973. 12 refs.

The effect of temperature, humidity, and sulfur dioxide concentration on the value of SO₂ measured by the lead dioxide method was measured using a flow-through experimental device. The speed at which SO₂ is absorbed by PbO₂ is predominantly affected by, and is directly proportional to the humidity. A high correlation was found between the quantity of SO₂ arrested by PbO₂ and that of sulfur trioxide measured by the standard quantitative determination method. The measured SO₃ value equals 1.035 times the quantity of SO₂ absorbed. There is a great effect of humidity on SO₃; SO₃ increases by 0.27 mg for every 1% increase in humidity.

38201

APTIC NO. 61536

Vogg, H. and R. Haertel

DETERMINATION OF TRACE ELEMENTS IN AIRBORNE DUST SAMPLES BY NEUTRON ACTIVATION ANALYSIS. (Spurenelementbestimmung in Luftstaubproben mittels Neutronenaktivierung). Text in German. Fresenius Z. Anal. Chem., 267(4):257-260, 1973. 10 refs.

Neutron activation analysis can be applied to the determination of trace elements in airborne dust samples with great advantage, even if the collection time is only a few hours. Cellulose paper filters for collection have proved to contain a particularly small amount of trace elements. Filter efficiencies are satisfactory for most elements. In a short-time irradiation of approximately 1 min in a reactor the elements selenium, vanadium, aluminum, magnesium, bromine, chlorine, indium, and manganese can be analyzed quantitatively; in a subsequent long-time irradiation of approximately 1 day, sodium, potassium, copper, arsenic, tungsten, lanthanum, cadmium, gold, antimony, samarium, calcium, iron, cobalt, zinc, chromium, and scandium can be analyzed quantitatively. Airborne dust concentrations for the elements selenium, vanadium, bromine, manganese, copper, arsenic, zinc, iron, and cobalt were determined at the Karlsruhe Nuclear Research Center and close to the motorway between Karlsruhe and Bruchsal. Increased values close to the motorway were encountered only for bromine. Lead as determined by atomic absorption behaves like bromine. The motorway values were 1600 ng/cu m for bromine and 2500 ng/cu m for lead.

38202

APTIC NO. 61156

Wallin, S. C.

SAMPLING OF PARTICULATES EMITTED FROM STATIONARY SOURCES. Ann. Occupational Hyg., 16(4):363-371, Dec. 1973. 6 refs.

The sampling of particulate matter emitted from stationary sources is reviewed in terms of selection of sampling position, osokinetic sampling, sampling procedure (cumulative versus determination of solids collected for each incremental point), and sampling apparatus. Commercial instrument types described include: the cyclone probe, the external filter, null-probe sampling nozzles, and the Anderson stack-gas sampler. A piezoelectric monitor which collects particles from the gas stream by electrostatic deposition onto a piezoelectric sensor is seen as probably being suitable for monitoring the mass of particles less than 20 micron. Sampling sections are recommended as a design feature for new installations, with the aim of providing good sampling conditions by avoiding flow vorticity and stratification.

38203

APTIC NO. 61226

Watanabe, Ikuro, Hitoshi Tsuchida, Shigeyuki Yamada, and Toshikazu Okita

GAS CHROMATOGRAPHIC ANALYSIS OF LOW MOLECULAR WEIGHT SUBSTITUTED ORGANIC COMPOUNDS. (Gasujo gansanso yuki kagobutsu no gasu)

kuromatogurafi ni yoru bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):272, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 27.)

Hydrocarbons can be measured to ppb amounts by several hundred ml of test material. But in actual air samples, hydrocarbons exist in concentrations more than 10 times greater. The separation of HC from gaseous test material is necessary in order to eliminate other HCs appearing in the same area of the chromatogram. By follow-up tests of pre-column separations using 1,2,3-tris(2-cyanoethoxy)-propane (TCEP), BB-oxydipropionitrile (ODPN) separated HCs with a shorter column and in a shorter time. Also, measuring low HCs with test elements after separating aromatic HC by porapak Q column is possible. The device is presented by a flow diagram, and the results are presented in a table and chromatograph.

38204

APTIC NO. 60845

Watson, James K. G. and Peter K. L. Yin

THE EFFECTS OF REFRACTION AND DISPERSION OF HIGH-ALTITUDE MEASUREMENTS OF ATMOSPHERIC GASES. INTERIM REPORT. Ohio State Univ., Columbus, Ohio, Dept. of Physics, National Oceanic and Atmospheric Administration Grant NG-28-72, Research Foundation Proj. 3460, 104p., Oct. 1973. 28 refs.

A study was performed on the effects of refraction and dispersion on high altitude measurements of atmospheric gases by the solar occultation technique, and a computer program was written to calculate a theoretical occultation spectrum in the vicinity of an isolated absorption line. The theory was applied to several infrared absorption lines of water vapor, particularly the 1404.988 cm to the minus one line, assuming a pure Lorentz line shape; and FORTRAN IV language programs were written for evaluation of the refractive and dispersive angular deviations of the ray path and the absorption with or without instrumental corrections. Variations in temperature and water vapor profiles were made in order to examine the sensitivity of the occultation technique to these parameters; other parameters that were varied included the absorption line intensity and width, the path of radiation, and the instrumental slit width. The effect of dispersion was to cause the apparent angular position of the sun to depend on the frequency of observation, and measurements of the apparent solar position at different frequencies could therefore in theory provide information on the density and distribution of dispersing matter in the atmosphere. (Author abstract modified)

38205

APTIC NO. 60885

Weitzel, Charles Edward

CHANGES IN THE PHOTOCONDUCTIVITY OF SPUTTERED FILMS OF CADMIUM SULPHIDE RESULTING FROM OXYGEN OR SULPHUR DIOXIDE CHEMISORPTION. North Carolina State Univ., Raleigh, Dept. of Electrical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 73-29,590, 1973, 71p. 46 refs.

The changes in the photoconductivity of sputtered films of cadmium sulfide resulting from oxygen or sulfur dioxide chemisorption were studied experimentally and theoretically. A model based on Wolkenstein's theory of weak and strong chemisorption was used to derive an expression for photocurrent as a function of time for changes in O₂ partial pressure. The theory was in general agreement with experimental data. The chemisorption time constant varied inversely with O₂ partial pressure, light intensity, and temperature. The model must be modified to be applicable at elevated temperatures. The theoretical model used to characterize CdS-O₂ interaction was used to analyze experimental data on the effect of SO₂ on the conductivity of CdS thin films. Steady-state and transient experimental data of the interaction between CdS and SO₂

with nitrogen as the background gas and the theoretical model were in general agreement. The theoretical model, however, did not predict the observed variation in steady-state photocurrent for experimental data taken at elevated temperatures with N₂ as the background gas and at 27°C with air as the background gas. When the SO₂ concentration was changed, the photocurrent reached a steady-state indication of the new SO₂ concentration level in tens of minutes for an SO₂ concentration of 200 ppm. The time constant for the photocurrent transient was inversely related to the gas partial pressure, the light intensity, and the temperature. With the experimental setup, SO₂ concentrations of 100 ppm in air and less than 100 ppm in N₂ were detected. The resolution of the detector was adversely affected by temperature and by using air instead of N₂ as the background gas. The experimental data are discussed relative to the usefulness of these films as gas detectors. (Author summary modified)

38206

APTIC NO. 61127

Wippmann, F.

THE NECESSARY DURATION OF SAMPLING TO OBTAIN REPRESENTATIVE DATA. (Die Dauer von Probenahmen im Zusammenhang mit deren Repräsentanz sowie verwandte Probleme). Text in German. In: Repräsentanz luftchemischer Messungen an Background-Stationen. Kommission zur Erforschung der Luftverunreinigung. Mitteilung VII, p. 21-25, 1973. 5 refs.

How representative data is obtained at a station measuring trace substances is discussed. The ratio of peak to average is often used. A measurement series is representative if the average concentrations of a certain trace substance plotted in a polar coordinate system according to the respective wind direction assume a circle. The ratio peak to average depends on the sampling time for both the individual measurement and the entire measurement series. The influence of the sampling time is shown by mathematical expressions.

38207

APTIC NO. 61332

Wyatt, Philip J.

OPTICAL ANALYZER FOR MICROPARTICLES. (Science Spectrum, Inc., Santa Barbara, Calif.) U. S. Pat. 3,770,351. 6p., Nov. 6, 1973. 3 refs. (Appl. Nov. 23, 1971, 45 claims).

A method and apparatus are described for identifying sub-microscopic particles by directing the particles through a highly collimated beam of light and simultaneously measuring the light intensity at a plurality of different angles relative to the point where the particles move through the beam. This method can be used to measure dust particles, particulate pollutants, spores, microorganisms, blood cells, and other organic cells from 0.01 to 100 micron in size. Unlike previous methods, this analyzer measures qualitative composition, as well as densities. (Author abstract modified)

38208

APTIC NO. 61375

Yokoyama, O.

PREDICTION OF SOX CONCENTRATION BY OPTIMUM FILTERING METHOD. (Saiteki firuta ni yoru SOx nodo no yosoku). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):400, 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973. Paper 138.)

Wiener's optimum filtering method, which was believed to be more objective and would cause the least discrepancy due to different observers, was used to predict the sulfur oxides concentration in Mizushima industrial area. The observed value of SO₂ concentration in the past five years were used to calculate the daily change of the average concentration. The change was found to be significant. From the self-correlation curve, it was found that SO₂ concentration at a given time interval was

related to that of several hours in advance, and the concentration could be predicted from daily change and irregular change. The irregular change was determined from the optimum filter which is a function of time and was in turn determined by Wiener-Hopf integral equation. The correlation coefficient between the observed value and predicted value was 0.8 to 0.9.

38209

APTIC NO. 61291

Kogai Mondai Kenkyukai (Japan)

MEASUREMENT OF OBNOXIOUS ODOR. (Akushu no sokutei). Text in Japanese. Kankyo Joho Kagaku (Environ. Inf. Sci.), 2(4):56-63, 1973.

The number of complaints of obnoxious odors has increased sixfold in the last six years. The reason for the delay in passing laws regulating odors is that they are difficult to measure. Methods include sensory tests and instrumental analysis. The odor control law has adopted instrumental analysis and six substances, ammonium, methylmercaptan, trimethylamine, methylcapitan, hydrogen sulfide, and methyl sulfide are to be controlled. Measurement methods are reviewed. The sensory tests include odor strength indication and the air dilution method. The odor strength indication method can be 3-step, 5-step, or 6-step. The air dilution method is based on the 50% Population Perception Threshold (of panel members, usually 5 to 7). The methods include the American Society for Testing and Materials injector method and the 3-point comparison method. None of these is fully satisfactory, and new methods are called for.

1972

38210

APTIC NO. 60634

Barch, Sidney A.

ANALYTICAL STUDIES IN VACUUM ULTRAVIOLET SPECTROPHOTOMETRY. Illinois Univ., Chicago, Dept. of Analytical Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Order no. 73-29, 343, 1972, 204p. 81 refs.

The development of a technique for the analysis of air pollutants using a vacuum ultraviolet spectrophotometer was investigated. Vapor samples of benzene, acetone, and aniline were analyzed in a flowing sample system that was developed and attached to the spectrophotometer. Good qualitative spectra was obtained. Analytical studies were initiated to determine the suitability of the instrumentation for trace quantitative analysis because high molecular absorptivities are common in the vacuum ultraviolet region. In all cases, the curves of the plots of absorbance versus concentration were found to represent various degrees of negative deviation from the Beer-Lambert law. The deviation was due to the presence of stray radiation. The deviation could be eliminated by use of a more powerful light source. An empirical equation was developed to describe the relationship between absorbance and concentration over the range of calibration points used. Good qualitative spectra can be obtained with the vacuum ultraviolet spectrophotometer. Calibration data can be obtained for quantitative studies, although unknown samples are beyond the capabilities of the present sampling system. (Author summary modified)

38211

APTIC NO. 60637

Bosch, Julius

STACK DUST EMISSION MEASUREMENT. (Einrichtung zur Messung der Staubemission von Schornsteinen und anderen staubfuehrenden Kanälen). Text in German. (Friecke und Hoepfner GmbH, Erlangen (West Germany)) W. Ger. Pat. Appl. 2,032,127. 5p., Jan. 5, 1972. 3 refs. (2 claims).

Instrumentation for dust concentration measurement in stacks and flue gas ducts in large-capacity combustion equipment,

and dust samplers designed to extend the measuring range by gas sample dilution with atmospheric air are described. The instrument is suitable for measurements in a concentration range of 50-500 mg/cu m at temperatures up to 200 C. The dust concentration is measured by pulling a filter paper around a radioactive source and scanning it with radioactive detectors. The gas collector tube in the stack carries a baffle plate and assumes a position dependent of the flue gas velocity. The measuring range is extended by diluting the dust-laden gas with fresh air from the atmosphere through a line with a pump. A controller between this line and the exhaust from the dust meter (which also includes a pump) automatically sets a butterfly valve in the exhaust line in such a way that the fresh air flow rate is always kept at a fixed percentage of the exhaust flow rate.

38212

APTIC NO. 60555

Breitenbach, Lawrence P. and Mordecai Shelef

DETERMINATION OF NITROGEN OXIDES AND AMMONIA IN GAS MIXTURES. (Verfahren zur quantitativen Messung von Stickstoffverbindungen in Gasgemischen). Text in German. (Ford-Werke AG, Koeln (West Germany)) W. Ger. Pat. Appl. 2,231,681. 18p., June 28, 1972. (17 claims).

To determine nitrogen oxides and ammonia in gas mixtures, the mixture is passed over molybdenum precipitated on dense carbon at 475 deg to convert nitrogen dioxide to nitric oxide. The NO concentration is measured by the chemiluminescence reaction with ozone. The mixture is passed over copper and carbon at 410 deg to convert the NH₃ to NO; the chemiluminescence is measured again; and the NH₃ concentration is calculated from the difference of the two measurements. This method is useful for the determination of nitrogen compounds in exhaust gases and gases of biological processes.

38213

APTIC NO. 60976

Buehne, Karl-Wilhelm and Ludwig Duewel

RECORDING MEASUREMENT OF DUST EMISSIONS IN THE CEMENT INDUSTRY BY MEANS OF THE RM 4 MODEL SMOKE METER BY SICK. (Registrierende Staub-Emissionsmessungen in der Zementindustrie mit dem Rauchdichtemessgeraet RM 4 der Firma Sick). Text in German. Staub, Reinhaltung Luft, 32(8):329-334, Aug. 1972. 11 refs.

A complete test of the RM 4 photoelectric smokemeter designed for dust concentration measurement on the extinction principle according to the directives issued by the German Federal Ministry of Internal Affairs was carried out in a laboratory and in a cement works under practical operating conditions. Comparative measurements of the dust concentrations were performed by the standard gravimetric method. The smokemeter satisfied the minimum requirements in every respect, including the susceptibility to temperature and main voltage variations. A definite linear relationship between the recorded extinction and the gravimetrically-determined dust concentration, with correlation factors ranging from 0.959 to 0.999, was established. A random assessment of the recording tape gave a more reliable evidence on emission behavior during continuous operating when the evaluated calibration curve was used than did occasional individual measurements.

38214

APTIC NO. 60683

Burianec, Z. and J. Burianova

APPENDIX I. TRANSLATION OF CARBON MONOXIDE PAPER. A NEW METHOD FOR CARBON MONOXIDE DETERMINATION. APPENDIX II. COMPUTER PROGRAM FOR MONITOR CALCULATIONS AND STATISTICAL ANALYSIS. In: Evaluation of Monitoring Methods and Instrumentation for Hydrocarbons and Carbon Monoxide in Stationary Source Emissions. Walden Research Corp., Environmental Protection Agency Rept. EPA-R2-72-106. Nov. 1972. (Also: Coll. Czech. Chem. Commun., 28(11):2895-2901, 1963.)

119

A new method to measure carbon monoxide was studied which uses its reaction with bis-(o-phenanthroline)-palladium chloride to yield a colored product. This method can determine, on the average, from .005 to .0005% CO (by volume) spectrophotometrically or from .015 to .0005% CO (by volume) photometrically. The accuracy of 10% relative is better than other analytical procedures. The method is rapid (20-25 min), and uses a small amount of gas to run a test (250 ml). This method would be particularly well suited for analyses of gases from industrial sources since the formation of carbonyl is selective and, therefore, is recommended as a general analytical method for CO determination. A computer program for monitor calculations and statistical analysis is also presented. (Author abstract modified)

38215 **APLIC NO. 60682**

Burns, E. A., A. Grant, D. F. Carroll, M. P. Gardner, and J. C. Gray

INSTRUMENTAL ANALYSES FOR WET SCRUBBING PROCESSES. TRW Systems, Redondo Beach, Calif., Applied Chemistry Dept. and Chemical Engineering Dept., Office of Air Programs Contract 68-02-0007, EPA-R2-73-172, 210p., Jan. 15, 1972. 33 refs.

Continuous onstream analytical methods suitable for optimization and control of wet limestone and dolomite scrubbing processes were examined with emphasis on non-disturbance of the chemical steady state condition. The study focused upon the development of on-line sampling and separation techniques to provide separation of the slurry system into solid and optically clear liquid phases and analysis and measurement methodology for pH, sulfite, sulfate, calcium, magnesium, carbonate, nitrite, and nitrate. The system designed and developed in the laboratory utilizing actual and simulated slurries (3% nominal loading) and recommended for field evaluation was comprised of a 1 gpm cyclone (cone) stage followed by a dual-parallel filter stage for polishing the liquid stream. X-ray fluorescence provided on-stream or laboratory elemental analysis capability for unseparated slurry as well as separated liquid and solid phases. Atomic absorption spectrophotometry was especially valuable for trace element analysis. A new method based on bisulfite bleaching of the furfural ultraviolet absorption was developed to facilitate analysis of dissolved sulfur dioxide (bisulfite and sulfite) for which no satisfactory methods of analysis existed. Two state-of-the-art methods for sulfate determination appeared to warrant further consideration and development, i.e., sulfate precipitation by barium with the measurement performed by turbidimetry or atomic absorption and ion exchange with barium chloranilate and colorimetric measurement of free chloroanilic acid. Feasibility tests demonstrated the potential utility of a pyrolysis/acidimetric carbonate determination. (Author summary modified)

38216 **APLIC NO. 60963**

Cunningham, A. T. S.

INDUSTRIAL POLLUTION: THE DEVELOPING ROLE OF MEASUREMENT AND CONTROL. Kent Tech. Rev., no. 7:5-9, May 1972. 10 refs.

Toxic products of combustion are identified, and the role of instrument monitoring systems are outlined with respect to minimization of toxic pollutants. Principal combustion contaminants can be classified in the following groups: smoke (carbon and ash particles less than 1 micron); grits (carbon and ash particles greater than 1 micron); organic compounds; nitrogen and oxygen compounds; carbon compounds; and sulfur compounds. Sulfur dioxide comprises up to 98% of the sulfur emitted. Nitric oxide is also an objectionable gas and in conjunction with hydrocarbons may act as a catalyst to give enhanced photooxidation rates for conversion of SO₂ to sulfur trioxide. Formation of sulfuric acid aerosols is observed in the form of a bluish haze. Most combustion pollutants can be monitored by instrumentation; however, no suitable method is available for on-line instrumental measurement of grits from an oil-fired power plant. Non-dispersive infrared instruments

for measuring carbon monoxide can measure as low as 30 vpm (full scale) and in conjunction with paramagnetic oxygen analysis could be added to automatic control systems. Any carbon monoxide change is a very sensitive indication of combustion conditions. Graphical data are given for variation in pollutant concentration with flue gas oxygen per cent.

38217 **APLIC NO. 60723**

Fedrick, Nicholas A., Alexis T. Bell, and Donald N. Hanson

PARTICLE COUNTING BY GLOW DISCHARGE PERTURBATION. Environ. Sci. Technol., 6(13):1117-1118, Dec. 1972. 1 ref.

A constricted glow discharge was assessed for its use as a means for counting and sizing airborne particulate matter. The device consisted of a tube in which two electrodes, separated by a disc containing a small orifice, were mounted; passage of a particle through the orifice caused a perturbation in the discharge current. A stable discharge was maintained using the following conditions: pressure upstream from the orifice equal to 20 torr, pressure downstream of the orifice equal to 2 times .001 torr, and current equal to 2.1 mA. A linear relationship appeared between pulse height and particle diameter, though the device with its present orifice of 153 micron was limited to detecting particle diameters on the order of 10 micron and larger. The principle of the device could be extended to smaller particles through the use of a smaller orifice, and preliminary results indicate that it is possible to sustain a discharge through a 30 micron orifice. (Author abstract modified)

38218 **APLIC NO. 60938**

Forziati, Alphonse F. and Louis G. Swaby

THE EPA MEASUREMENTS AND INSTRUMENTATION PROGRAM. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 177-197. (Oct. 17-19.)

The Environmental Protection Agency's measurements and instrumentation research and development program is described in terms of present high priority needs, some future requirements, and the resources associated with the program. Instrumentation and analytical methods are listed for air, water, pesticides, and non-ionizing (electromagnetic) radiation hazard program elements in terms of instrument application and financial allocation. Major categories of air pollutants listed include: oxidants, carbon monoxide, oxides of nitrogen, sulfur oxides, and particulates. The most urgent current needs are for better methodology for characterization of particulate air pollutants and reliable methodology for the rapid recovery, identification, and quantification of viruses and bacteria.

38219 **APLIC NO. 55016**

Heard, M. J. and R. D. Wiffen

AN AUTOMATIC DEVICE FOR CONTINUOUS SAMPLING OF THE ATMOSPHERIC AEROSOL FOR ELECTRON MICROSCOPY. Atmos. Environ., 6(5):343-351, 1972. 3 refs.

Equipment has been developed which collects a continuous series of 3-hour samples of the atmospheric aerosol on a strip of an AA Millipore membrane filter. Each sample has an area of 0.35 sq cm and represents a filtered volume of 45 l. The sampler requires reloading at intervals of 8 weeks and collects efficiently over the particle size range 0.01 to 5.0 micron in diameter. The incoming aerosol is warmed to evaporate aqueous droplets, and the collected samples are maintained at a low relative humidity to prevent damage to the surface deposit. Examples are given of some types of short term change which have been observed in the particulate composition of the atmospheric aerosol. (Author abstract)

38220

APTIC NO. 60592

Hodgeson, J. A., R. K. Stevens, and B. E. Martin

A STABLE OZONE SOURCE APPLICABLE AS A SECONDARY STANDARD FOR CALIBRATION OF ATMOSPHERIC MONITORS. ISA (Instr. Soc. Am.) Trans., 11(2):161-167, 1972. 12 refs. (Presented at the Instrument Society of America, National Symposium of the Analysis Instrumentation Division, 17th, April 19-22, 1971.)

A stable ozone source for the calibration of atmospheric ozone-oxidant analyzers has been evaluated at the National Bureau of Standards as a secondary ozone calibration source. The total system is comprised of a diaphragm pump, air clean-up train, low pressure flow regulation, flow-meter, ozone source, and sample manifold. The ozone source consists of a current-controlled, low-pressure, mercury-arc lamp that irradiates a quartz tube through which the air flows. Flow is maintained constant by at 10 l/min, and variable ozone levels between 0 and 1 ppm are obtained by variable shielding of the lamp envelope. Data from a 3-month field evaluation of ozone-oxidant analyzers in downtown Los Angeles suggest that the ozone source, once initially calibrated, provides more reliable routine calibration than manual iodometric analyses. The system also has potential application in the calibration of nitric oxide and nitrogen dioxide monitors. (Author abstract modified)

38221

APTIC NO. 60948

Holmes, R. and G. Leppelmeier

REMOTE SENSING-WORKSHOP 6. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf. Environ. Livermore, Calif., 1972, CONF 721002, p. 331-332. (Oct. 17-19.)

An assessment of the state of the art of development and application of remote sensing techniques to pollution studies has revealed that remote sensing techniques are not limited to research areas, but are applicable to environmental management problems, both for the purpose of specific enforcement of standards and practices, and planning or strategy evaluation. Suitable methods and devices were identified for most of the environmental problems. Two classes of remote sensing devices were discussed: photometry, photography, and related techniques, which include multiple wavelengths and vidicon imaging; and sophisticated instrumentation, including multi-wavelength spectroscopy, laser light scattering or fluorescence, and absorption spectroscopy, were distinguished.

38222

APTIC NO. 60939

Lawrence, James D., Jr. and Lloyd S. Keafer, Jr.

REMOTE SENSING OF THE ENVIRONMENT. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 224-235. 5 refs. (Oct. 17-19.)

Capabilities of the National Aeronautics and Space Administration and Atomic Energy Commission laboratories in the area of remote sensing of the environment are described in terms of currently available techniques and future research directions. Current state of the art achievements include: identification of the properties of the substance or environmental parameter to be measured that will affect the absorption, transmission, or emission of electromagnetic energy; identification of specific wavelengths in the electromagnetic spectrum; identification of instrument parameters required to make measurements; and identification of appropriate instrument platforms. Remote sensing systems currently under development include those with the following measurement capabilities: vertical profiles of trace gases (ozone, nitric acid, nitrous oxide, water vapor, methane, nitrogen dioxide); column densities of trace gases (sulfur dioxide, nitrogen dioxide, ammonia, methane, carbon dioxide, carbon monoxide); absorption spectra of trace gases; improved sensor specificity

and sensitivity; and measurement of aerosols and trace gases. Future research requirements include: development of techniques for measuring the vertical distribution of trace constituents in the troposphere, determining the absorption properties of pollutant gases in the real atmosphere, and establishing the basic absorption properties of pollutant molecules in the microwave region of the spectrum, and exploration of laser scattering techniques along with advancement in tunable laser technology.

38223

APTIC NO. 60814

Leupolt, Adalbert

INDIRECT PROBING OF THE ATMOSPHERE BY THE OCCULTATION TECHNIQUE. PART 2: EXPERIMENTAL AND THEORETICAL SPECTRA OF ATMOSPHERIC GASES IN THE INFRARED SPECTRAL RANGE. (Indirekte Sondierung der Atmosphäre mittels Okkultationstechnik. Teil 2: Experimentelle und theoretische Spektren atmosphärischer Gase im infraroten Spektralbereich). Text in German. Ludwig-Maximilians-Universität, Munich (West Germany) Meteorologisches Inst., Bundesministerium fuer Bildung und Wissenschaft BMW-FB-W-72-14, 89p., April 1972.

NTIS: N73-31369

Calculated and experimentally determined transmissions for atmospheric gases in the infrared spectral range are presented in diagrams. Measured and degraded calculated transmissions of the 15 micron carbon dioxide band, of the 3.31 micron methane band, of the carbon monoxide band in the wave number range of 2010-2260/cm, of the 4.50 micron nitrous oxide band, and of the 32-52 micron ammonia band are presented.

38224

APTIC NO. 60940

Lyon, W. S.

NUCLEAR AND X-RAY TECHNIQUES. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 236-250. 26 refs. (Oct. 17-19.)

X-ray and nuclear techniques available at Atomic Energy Commission and National Aeronautics and Space Administration laboratories for the determination of trace inorganic elements in the atmosphere and water are outlined. Techniques examined include: neutron, photon, and charged particle activation analysis; x-ray fluorescence; electron spectroscopy; the use of stable isotopes; and spark source mass spectrometry. Examples of data obtained from some of the techniques are given along with cost estimates for the methods employed.

38225

APTIC NO. 60967

Moriyama, N.

THE APPLICATION OF X-RAY FLUORESCENCE METHOD TO POLLUTION MEASUREMENTS. (Kogai sokutei ni okeru keiko x-sen bunsekiho no oyo). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(11):1066-1078, 1972. 3 refs.

A general discussion is given for the x-ray fluorescence method including its application to the measurement of pollutants in air, water, and foods. Analysis of dust in air by this method can eliminate the procedure of sample adjustment, thus preventing the possible loss due to burning or ashing of the sample. Therefore, it is less time-consuming and more accurate. The most important factor of this method is the preparation of a standard sample which is used to produce a calibration curve. A high volume air sampler is usually employed to collect samples on a glass fiber filter for a given period. Examples showed that linear calibration curves were obtained for copper from 0 to 0.9 mg and for manganese from 0 to 1.5 mg. Analysis of heavy oil containing up to 3 wt% of sulfur is also possible and the sensitivity is about 1 to 3 ppm.

38226

APTIC NO. 60951

Peters, E. T., J. E. Oberholtzer, and J. R. Valentine

DEVELOPMENT OF METHODS FOR SAMPLING AND ANALYSIS OF PARTICULATE AND GASEOUS FLUORIDES FROM STATIONARY SOURCES. FINAL REPORT. Little (Arthur D.), Inc., Cambridge, Mass., Environmental Protection Agency Contract 68-02-0099, Rept. EPA-R2-72-126, Rept. 73757, 133p., Nov. 1972. 54 refs.

NTIS: PB 213-313

The development of tentative procedures for sampling and analysis of fluorides emitted from various processes within the primary aluminum, iron and steel, phosphate rock processing, and glass manufacturing industries is reported. In most cases, the distinction is made between gaseous, insoluble particulate, and soluble particulate fluoride species. Stack emissions from most of the processes that were considered can be sampled in a manner that separates the particulate from the gaseous species. For the tentatively recommended procedure, the particulate is collected by means of a filter or electrostatic precipitator heated above the water dewpoint with gaseous fluorides subsequently collected in a series of water impingers maintained at room temperature. Some very wet process streams, such as for the production of diammonium phosphate, include considerable water entrainment, precluding a particulate collector. In this case, the particulate is collected in the impingers and soluble particulate fluoride cannot be distinguished from gaseous fluorides. Chemical analysis procedures have been developed which emphasize procedural simplicity but which also provide reliable and reproducible results. The fluoride-specific ion electrode has been found to be the most suitable approach for measurement of fluoride concentration. Direct measurements on impinger solutions after appropriate buffering appears feasible in many cases. Otherwise, fusion and distillation procedures are required to assure solubility and separation from interfering species. (Author summary)

38227

APTIC NO. 60593

Pierce, P. E. and C. E. Cowan

MEASUREMENT OF PARTICLE SIZE OF ANIONIC ELECTRODEPOSITION RESIN MICELLES AND FACTORS WHICH INFLUENCE MICELLE SIZE. *J. Paint Technol.*, 44(568):61-67, May 1972. 13 refs. (Presented at the Federation of Societies for Paint Technology, 49th, Annual Meeting, Detroit, Mich., Oct. 28, 1971.)

The micelle size of electrodeposition resins can be determined from transmission light scattering measurements and application of the Mie scattering theory. Resin micelle diameters are typically in a range of 60-890 Å in diameter, and micelle size for several resin types is a function of the number of ionized salt groups per unit volume of insoluble phase. A theory based on electrical and cohesive energy contributions to the total micelle energy is capable of providing a framework for correlating size with resin composition. Measurements with optical microscopy spectrophotometry (turbidity), and light scattering are discussed.

38228

APTIC NO. 60444

Roessler, Johannes

CONSIDERATIONS AND EXPERIMENTS CONCERNING THE QUALITATIVE AND QUANTITATIVE MEASUREMENT OF SMOKE PLUMES BY MEANS OF LIDAR. (Ueberlegungen und Versuche zur qualitativen und quantitativen Vermessung von Rauchfahnen mit Lidar). Text in German. Staub, Reinhaltung, Luft, 32(10):385-390, Oct. 1972. 24 refs.

Practical aspects of the qualitative and quantitative measurement of smoke plumes by lidar, and especially by the elastic backscattering technique (the method of the greatest practical importance currently) are discussed. The elastic backscattering method is suitable for the determination of the particle distribution in space, of the number density, and of the particle concentration. However, the measurements can be converted

only approximately into these quantities, and require a considerable effort in calculation. Therefore, an automatic evaluation system has been developed which is composed of the lidar, the oscillograph with a photomultiplier, a television camera monitoring the former, a counter, and a computer. The data are stored on magnetic tapes for future access.

38229

APTIC NO. 60711

Sakai, K.

APPARATUS FOR THE MEASUREMENT OF AIR POLLUTANTS. (Taiki osen sokuteiyo kiki ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(1):1041-1065, 1972.

A general discussion is given for the instrumental analyses of air pollutants including sulfur oxides, nitrogen oxides, carbon monoxide, particulates, and offensive odors. Ten to fifty liters of flue gas, which has a higher concentrations of pollutants, were usually sampled at a rate of 1 to 2 l/min while 100 to 1000 l of air were sampled at 30 to 300 l/min for analysis. Spectrophotometric methods including ultraviolet infrared, atomic absorption, and fluorescence, and gas chromatographic methods have been successfully used for the analyses of various pollutants. For the analysis of sulfur dioxide, the sample gas was dissolved in 5 ml of absorbent, which was prepared by dissolving 27.2 g of mercuric chloride and 11.7 g of sodium chloride in 500 ml of water followed by the addition of 0.3 g of sodium azide and 50 g of glycerin and dilution to 1 l; then p-rosaniline solution was added to the resulting solution whose absorbance near 570 nm was measured. Offensive odors are usually determined by gas chromatographic methods with a thermal conductivity detector (concentration 0.1% up), flame ionization detector (1 ppm up), electron capturing detector (0.1 ppm up), flame photometric detector (0.01 ppm up), helium ionization detector (0.01 to 1 ppm), and thermal ionization detector (0.01 ppm up).

38230

APTIC NO. 58751

Seaney, R. J., R. K. Halpin, and B. A. Maguire

A PORTABLE RECORDING INSTRUMENT (SIMSLIN) FOR MONITORING RESPIRABLE AIRBORNE DUST. *Inst. Natl. Rech. Chim. Appl., Dixieme Colloq. Atmos. Polluees, Proc.*, Paris, France, 1972, 8p. 5 refs. (May 3-5.)

A prototype light scattering instrument (SIMSLIN) was constructed and used to assess response to dust clouds of various materials. The SIMSLIN, its radiation source and detector, its optical geometry, the radiation-trap design, and electronic circuits are described. The overall error on the experimental data was + or - 20% for the values of mass and volume concentration and + or - 30% for the values of surface-area and number concentrations. The instrument may be used as a means of indicating the total airborne concentration in terms of surface area, of respirable-size dust particles in a cloud containing a mixture of coal, limestone, and quartz, in any proportions.

38231

APTIC NO. 60657

Shaller, Robin E. and Charles E. Lapple

PARTICLE SIZE CLASSIFICATION OF PLASTIC POWDERS. *J. Paint Technol.*, 44(571):86-92, Aug. 1972. 10 refs.

Particle size classification of plastic powders is reviewed. Centrifugal air classification appears to be an effective method for tailoring particle size distributions of plastic powders; while cut size, sharpness, and fuel capacity are important in assessing classifier performance since they determine product quality and cost. A large variety of classifier equipment is commercially available and ranges in feed capacity from many tons/hr with the largest units to a few g/hr with laboratory equipment. Cut size capability with plastic powder ranges from about 70 to 1 micron in production quantities. The degree of closeness of the particle diameters in the intermediate fraction of multiple classification depends upon the performance capabilities of the unit used. Closely sized powders are important

in research work, as for example inhalation studies involving closely sized fractions of coal dust in the respirable range (less than 10 micron). (Author abstract modified)

38232

APTIC NO. 58717

Simms, R. John

INDUSTRIAL TURBIDITY MEASUREMENT. ISA (Instr. Soc. Am.) Trans., 1972. 3 refs. (Presented at the ISA Conference and Exhibit, 26th Annual Conference, Chicago, Ill., 1971.)

The state-of-the-art of turbidity measurement for process monitoring and control purposes in industry is reviewed, and data generated from the theory of light scattering by particles are summarized with emphasis on the variables of particle size and observation angle. Graphical representation of the differences between the light scattering properties of non-filterable hazes and filterable particulate suspensions indicate that the former exhibit side- and forward-scattering effects of comparable intensity, while the latter exhibit far stronger forward-scattering properties. Side scatter designs are useful only on haze intensity measurements, while it is necessary to use the forward-scatter type of instruments for particulate turbidity or a combination of particulate and haze turbidities. The use of turbidity standards with each design of turbidimeter is given along with a description of a typical, modern, forward-scatter instrument suitable for in-line applications. (Author abstract modified)

38233

APTIC NO. 60702

Simpson, C. C.

THE CONTINUOUS MEASUREMENT OF HYDROCARBONS IN VEHICLE EXHAUST. Aust. J. Instrum. Contr., 28(3):58-61, June 1972.

Gas analyzers with continuous readout have been frequently misused as a result of lack of appreciation of their particular merits and drawbacks. This has been the case in certain facets of vehicle exhaust emission studies and control legislation. Two methods of analysis appear to be applicable to hydrocarbons in vehicle exhaust. The method initially chosen as the legislative standard in the U. S. (nondispersive infrared spectrometry) is the inferior of the two with regard to the significance of the results obtained. The more satisfactory technique (flame ionization detection) is now being seriously considered. A comparison of the two techniques is given, together with a description of an analyzer, designed and built in Australia, using the flame ionization principle. (Author summary)

38234

APTIC NO. 60910

Villalobos, Richard

FLAME IONIZATION ANALYSIS OF POLLUTANTS IN THE ATMOSPHERE. (Vorrichtung und Verfahren zur Analyse des Gehalts von Luft an Pollutionssubstanzen). Text in German. (Beckman Instruments, Inc., Fullerton, Calif.) W. Ger. Pat. Appl. 2,218,776. 25p., April 18, 1972. (12 claims).

The total hydrocarbon content of polluted air and of the individual constituents can be determined by flame ionization analysis. The total HC is determined in a sample injected into a stream of air as a carrier gas freed from HC by passage over a heated nickel catalyst on a suitable carrier. The analyses of the various constituents of the polluted air sample are made on samples eluted by hydrogen from a series of chromatographic columns and burned in the hydrogen flame surrounded by the hydrocarbon-free air. The chromatographic separation is carried out in a first polymer-packed column with retention of all HC heavier than ethane. The lighter fractions are separated in the second polymer packed column, and the eluted methane and carbon monoxide are separated in the third molecular sieve packed column. The CO is passed over a supported Ni catalyst at 300 deg for conversion to CH₄ prior to determina-

tion in the flame ionization apparatus which is provided with plate electrodes whose signals are amplified and recorded as chromatograms.

38235

APTIC NO. 60906

Wood, R. C.

APPARATUS FOR SAMPLING PARTICULATES IN GASES. Litton Industries, Beverly Hills, Calif., National Aeronautics and Space Contract NASw-1395, NASA-Case-HQN-10037-1, 17p., 1972. Also: (National Aeronautics and Space Administration) U. S. Pat. Appl. 235,957. 15p., March 20, 1972. (claims not given).

An apparatus for sampling particulates in gases which comprises an improvement of the combination of the slit impactor and the air ejector pump apparatus is described. The collection cylinder has a plurality of slit impactors running longitudinally on its surface. The cylinder is stored within a storage casing when sampling is not taking place. Inside this casing, the collection surfaces are isolated from the atmosphere by seals formed between the top plate of the cylinder and the flanges of the casing and by the seal of the plate with the walls of the casing. When a valve is opened, compressed gas is supplied from a storage tank to the air ejector pump and the actuator, forcing the piston upward. As the piston is driven upward, the collection cylinder is moved out of the storage casing by means of the connecting rod. A spring associated with the actuator puts the collection cylinder back into the stowed position in the casing. Thus the collection cylinder is returned to the stowed position when the supply of compressed gas to the actuator is cut off. The apparatus provides a means of efficiently collecting extraterrestrial dust from the atmosphere in a manner which prevents the contamination of the samples due to exposure to the atmosphere or the presence of unwanted particles on the sample collection surface. (Author abstract modified)

38236

APTIC NO. 60368

Yamashita, Kenichi

MEASUREMENT OF AIRBORNE PARTICULATE IN CLEAN ROOM. (Kuki-chu ni okeru biryushi no soku-teiho). Text in Japanese. Junkatsu (J. Japan Soc. Lubrication Engrs.), 17(11):712-719, Nov. 1972. 7 refs.

Two different methods of measuring size and concentration of airborne particulates are discussed. The first uses light scattering or a fog chamber as the detection method and is good for measurements of particulates smaller than 10 microns in diameter. The second is the membrane filter-microscope method, useful for measuring particulates greater than 5 microns in diameter. Results of measurements made on a clean room and clean bench by these methods are given.

38237

APTIC NO. 60822

Little (Arthur D.) Inc., Cambridge, Mass.

ANALYSIS OF THE ODOROUS COMPOUNDS IN DIESEL ENGINE EXHAUST. (FINAL REPORT). Environmental Protection Agency Contract EPA 68-02-0087, Coordinating Research Council Proj. CAPE-7-68, Rept. ADL 73686-5, 127p., June 1972. 6 refs.

The quantitative relationships between methods for measuring odors in diesel exhausts and the odors were investigated. New odor measurement techniques were developed in the form of a dose-response relationship. The sample odor intensity is reported by an odor panel using a dynamic test chamber and the presentation of a range of controlled concentrations. A routine preparative scale liquid chromatographic procedure is described to separate the diesel exhaust sample into its three major chemical fractions: paraffin (LCP), aromatic (LCA), and oxygenates (LCO). The LCA and LCO fractions represent the oily kerosene and smoky burnt odor groups. The LCP fraction does not contain species contributing to the exhaust odor. Mass spectrometry methods were completed for the aromatic

and oxygenate fraction which allow a comparison between the relative amount of odorous components in the two isolated odor fractions. The total exhaust odor intensity appears to be accurately represented by the abundance of the partial oxidation products as determined by liquid chromatographic procedures. (Author summary modified)

1971

38238

APTIC NO. 60691

Caragay, Alegria B., John T. Funkhouser, David A. Kendall, Gregory Leonardos, and Philip L. Levins

CHEMICAL IDENTIFICATION OF DIESEL EXHAUST ODOR SPECIES. I. HYDROCARBONS: OILY-KEROSENE ODOR COMPLEX. Preprint, American Chemical Society, Washington, D. C., 32p., 1971. 8 refs. (Presented at the American Chemical Society, National Meeting, 161st, Los Angeles, Calif., March 28-April 2, 1971.)

The chemical identity of the hydrocarbons in diesel exhaust responsible for the oily-kerosene odor character was determined. The hydrocarbons are alkyl benzenes, indans/tetralins, and indenes. The overall methodology included: collecting large volumes of diesel engine exhaust by condensation O C; extracting the organic portion of the exhaust condensate; separating the odorous components of the extract from the non-odorous (and major) portion by liquid chromatography; and identification by high resolution mass spectrometry. Sensory evaluation techniques were applied at each stage of the chemical and physical separation scheme. (Author abstract modified)

38239

APTIC NO. 60643

Goldmann, Wolf

INSTRUMENT FOR THE ANALYSIS OF GAS SAMPLES. (Einrichtung zur Untersuchung einer Gasprobe). Text in German. (Polysius AG, Neubeckum (West Germany)) W. Ger. Pat. Appl. 2,136,912. 5p., July 23, 1971. 3 refs. (3 claims).

A gas sampler with an analytical instrument for cylindrical rotary kilns for the heat-treatment of solid materials is described. The arrangement of the gas sampler permits the analytical instrument to be located at a relatively great distance from the rotary kiln. The gas sampling probe is connected to a bypass line which leads to the immersion tube of an upper cyclone of the gas preheater for the generation of underpressure and which is also connected with the instrument through a connection pipe. The cross section of the bypass line is at least 30 times larger than that of the connection pipe leading to the instrument.

38240

APTIC NO. 60905

Himi, Koji, Shigeru Miyazaki, Yukio Otsuka, Fumio Muramatsu, and Tsuneto Koyama

SIMPLIFICATION ON THE MEASUREMENT OF DUST CONCENTRATION AND THE COLLECTION OF HEAVY METAL DUST ANALYSIS SAMPLES FROM EXHAUST GAS IN A SMOKE DUCT. (Endo haigasuchu no baijin nodo sokutei oyobi jukinzoku bunsekiyo shiryo saishu no kanika). Text in Japanese. Japan. Chem. Soc. Natl. Meet., 25th, Tokyo, Japan, 1971, p. 232. (Oct. 11-14, Paper 3F18.)

An improved dust tube was devised in order to simplify sampling methods for flue gas dusts. This tube utilizes a glass holder with a silica wool cylindrical filter paper insertion. Its performance was checked by passing gas with a known concentration of fly ash into a 16 m duct, and the concentration at the exit and the pressure loss were measured. Flue gases of a dry furnace, a ceramic kiln, and a boiler were checked at the Japanese Industrial Standard multi-point measurement method and the single-point cross section method. Impact sampling

and heavy metal analysis dust sampling were obtained. The dust samples were good and appropriate for heavy metal analysis. The pressure loss was about 1/20 of that of previously used dust tube with glass wool. The large vacuum pump which was necessary previously is not required for this method. This sampler can also withstand 3 hr of sampling for flue gas temperatures as high as 600 C. But in this case, heat pretreatment will be necessary.

38241

APTIC NO. 60606

Kastka, J., G. Winneke, and G. G. Fodor

THE PROBLEM OF MALODOROUS SUBSTANCES, ESPECIALLY OF SUCH PRESENT IN MOTOR VEHICLE EXHAUST GASES. (Geruchsintensive Stoffe, insbesondere in Autoabgasen). Text in German. Medizinisches Inst. fuer Lufthygiene und Silikoseforschung, 77-82, 1971. 9 refs.

Studies on motor vehicle-generated malodorous emissions are reviewed, and problems of the evaluation of odor nuisances are discussed with special regard to diesel engine exhaust malodorous components. The odor concentration of diesel engine exhaust gas, collected at the exhaust pipe, ranged from 100 to 9000 odor units, which means that the diesel engine exhaust has to be diluted with clean air by a factor of 100 to 9000 to reach its odor threshold. Diesel engine exhaust odor was perceived to be a more noticeable odor than gasoline engine exhaust, and also a correlation with the degree of the perceived odor nuisance and the aldehyde concentration in the diesel engine exhaust was established. The rate of diesel exhaust emission was between 1200 and 14,000 odor units. Odor panel tests should be replaced by objective neurovegetative method, involving the measurement of such physiological parameters as the electrogalvanic skin resistance, the arterial pressure, pulse rate, rate of ventilation, and gastric motility.

38242

APTIC NO. 60556

Roess, Dieter

DETECTOR FOR AIR/WATER POLLUTANTS. (Vorrichtung zur Bestimmung von Luft- und Wasserverunreinigungen). Text in German. (Siemens AG, Berlin (West Germany)) W. Ger. Pat. Appl. 2,134,369. 8p., July 9, 1971. (6 claims).

A device of increased measuring sensitivity is described which can be used in the detection of air and water pollutants. It consists of a laser pulse transmitter and a receiver in which the backscattered pulses are resolved by a spectrometer and analyzed by Raman scattering with respect to the presence of scattering atoms and molecules. The entire spectrum of the scattered pulses is simultaneously evaluated quantitatively over several spectral ranges by a laser light intensifier and a system of photodetectors.

38243

APTIC NO. 55129

American Society for Testing and Materials, Philadelphia, Pa., Committee D-22 on Sampling and Analysis of Atmospheres **STANDARD METHOD FOR COLLECTION AND ANALYSIS OF DUSTFALL (SETTLEABLE PARTICULATES).** Book ASTM Stand., 1971:425-429, 1971. 3 refs.

A procedure for the field collection of particulates settling from the atmosphere and for the preliminary characterization of the sample matter is presented. Open-top collectors of a specified size and shape are located outdoors to provide particulate samples that are representative of the area being studied. The collected material is taken to the laboratory in a closed container for weighing and analysis. Procedures are described for determination of the pH, total weight of the settleable particulates, total water and benzene solubles, and total combustible and noncombustible matter. Care must be taken to avoid foreign deposits, avoid loss of material by wind action, and protect against freezing of liquid sample. Materials consist of a collector, sieve, oven, filter paper, water, and an-

tifreeze. Sampling procedure is discussed in terms of general principles, preparation of the collector, sampling time, handling the collected sample, selection of the sampling site, the number of sampling stations, and auxiliary information.

1970

38244

APTIC NO. 60568

Chand, Ramesh and Philip R. Cunningham

CHARACTERIZATION OF ORGANIC SOLVENTS FOR ELECTROCHEMICAL AIR POLLUTION SENSORS. IEEE (Inst. Elec. Electron. Engrs.) Trans. Geosci. Electron., Ge-8(3):158-161, July 1970. 1 ref.

High boiling organic electrolyte systems were evaluated by sweep voltammetry as pollution sensors for the detection of sulfur dioxide and nitrogen oxides. The solvents evaluated were 1,2-propanediol cyclic carbonate, gamma-butyrolactone, formamide, and N,N-dimethylformamide. Dissolved pollutant gases were activated and electrooxidized or electroreduced by changing the potential on a sensing electrode. The data can be rapidly collected and are adequate to give information pertaining to reaction potentials and the resultant current, possible interfering gases, and electrolyte stability. Tests of assembled pollution sensors utilizing electrolytes selected by sweep voltammetry verify the usefulness of the method. (Author abstract modified)

1969

38245

APTIC NO. 60716

Eichmeier, J. and P. Scholler

CAMSHAFT-CONTROLLED ELECTRONIC CONDENSATION NUCLEI COUNTER WITH MOSFET TYPE TEST VALUE STORAGE UNIT. (Ueber einen elektronischen Kondensationskernzaehler mit Nockenwellensteuerung und MOSFET-Messwertspeicherschaltung). Text in German. Archiv Tech. Messen, no. 5:656-9:75-80, April 1969. 15 refs.

A camshaft-controlled, electronic condensation nuclei counter with a MOSFET type test value storage unit is described. The air to be tested is passed through a humidifier in which the humidity is increased to 90%, after which the air sample is pressurized with filtered, humidified air to 125% overpressure. The undercooling, provoked by adiabatic expansion of the air sample, produces condensation of the water vapor on the condensation nuclei, thus forming a fog whose density is directly proportional to the concentration of the condensation nuclei. The fog density is measured electronically by recording the attenuation of the current of an electric eye which receives rays through the fog from a lamp. The sampling, expansion, and light attenuation measurement are controlled by a camshaft.

38246

APTIC NO. 60618

Schnitzler, H.

STUDIES ON THE SUITABILITY OF RECORDING INSTRUMENTS FOR THE MEASUREMENT OF DUST CONCENTRATIONS IN FLUE GASES. (Untersuchungen ueber die Eignung registrierender Gerate zur Messung des Staubgehaltes in Abgasen). Text in German. Gesundheits-Ing., 90(10):307-309, 1969. 3 refs.

Comparative suitability tests of two optic, one contact electric, and a beta-ray instruments for the recording of dust concentrations in flue gases are described. The flue gas samples were taken behind a coal-fired furnace. The two optical instruments, determining the dust concentrations from the attenuation of the light intensity by the flue gas flow, had dispersions + or - 39% to + or - 68% around a limit value of 150 mg/cu m. The readings of such optic instruments are modified by such factors as the refractivity index and the grain size of the fly ash. Another contact electric instrument, measuring the dust con-

centration on the basis of the electric charge of the particles, had a dispersion of + or - 33%. The readings of such instruments are influenced by changes in the dielectric constant of the particle surface. Another instrument measured the dust concentration by determining the rate of attenuation of beta rays passing through a dust layer deposited on a filter. Its readings had a dispersion of + or - 22%. This low-activity beta-ray instrument, now under development, promises to be the best of all types of instruments tested.

38247

APTIC NO. 60659

Szostak, Roland, Ludwig Greissl, and Juergen Hildebrandt

SMOKE DENSITY INDICATOR. (Rauchdichtemessgeraet).

Text in German. (Sick, Erwin, Icking (West Germany)) W. Ger. Pat. Appl. 1,908,072. 9p., Feb. 18, 1969. (4 claims).

A smoke density indicator, composed of a light source, photocell, and an optical system for focusing the beam, is described. Both the light source and the photocell have a spectral selectivity for a range or ranges outside the absorption bands of water vapor. The absorption bands of water vapor are suppressed by one or more optical filters in the path of the beam.

1968

38248

APTIC NO. 60551

Hyde, Paul E.

PARTICULATE SAMPLING OF WIGWAM BURNERS.

Oregon State Univ., Corvallis, School of Forestry Research Lab., State of Oregon Rept. F836, Public Health Services Rept. 1-DO1-U1-00119-01, 24p., Oct. 1968. 32 refs.

Some common methods and equipment for sampling particles and the suitability of these methods for sampling particulate emission from wigwam burners are discussed. The recommended isokinetic sampling train includes: a 7/8-inch diameter sampling probe with provision for velocity equalization by a calibrated, null-balance, hot-wire anemometer system, a cyclone or dry filter, three Greenburgh-Smith impingers, a dry-gas meter, and a vacuum pump. Differential-pressure measurements to insure isokinetic sampling may be unreliable in wigwam burners because of the low velocity of the gas. (Author abstract)

38249

APTIC NO. 60598

Sieth, Joachim

INSTRUMENT FOR THE CONTINUOUS MEASUREMENT AND DISPLAY OF THE SULFUR TRIOXIDE CONCENTRATION IN GASEOUS MIXTURES. (Gerat zur kontinuierlichen Messung und Anzeige der Konzentration von Schwefeltrioxid in einem Gasgemisch). Text in German. (Siemens AG, Berlin (West Germany)) W. Ger. Pat. Appl. 1,773,763. 4p., July 3, 1968. 3 refs. (8 claims).

An instrument for the continuous measurement and display of sulfur trioxide concentrations in flue gases is described. The flue gas, sucked in through a heated inlet, and dosaged, superheated water vapor, flow through a reaction cooler for the conversion of SO₃ into sulfuric acid whose conductivity, measured in a conductimeter cell, is a measure of the SO₃ concentration in the flue gas. All other components of the flue gas are insoluble in the condensate. Such absorbed gas components - sulfur trioxide and carbon dioxide - are desorbed in a separating column with an enlarged inner surface. The condensate volume is kept constant by adequate dosaging of water vapor from an evaporator.

125

38250

APTIC NO. 56281

Mueller, Peter K.

DETECTION AND ANALYSIS OF ATMOSPHERIC POLLUTANTS. Preprint, California Univ., Coll. of Engineering, Combustion-Generated Air Pollution, 37p., June 1967. 54 refs.

Methods for the detection and analysis of atmospheric pollutants are outlined. The collection methods include in situ methods such as sieves, impactors, absorption surfaces, long path observations, and odor detection; aerosol gathering by inertial techniques, gravitational techniques, gradient techniques, diffusional methods, filtration methods; and gas sampling by storage, absorption, condensation, adsorption, and sample volume measurements. Common techniques for the analysis of the following aerosols are presented: dustfall, suspended particulates by gravimetric analysis, trace metals such as lead, zinc, and iron by atomic absorption or x-ray fluorescence spectroscopy; trace metals such as vanadium, chromium, nickel, and beryllium by emission spectroscopy, and organic matter. Outlined methods for the analysis of gases include sulfur compounds by lead dioxide candles, sulfur dioxide, hydrogen sulfide, mercaptans, formaldehyde, carbon dioxide, carbon monoxide, C1 to C5 hydrocarbons by chromatography, oxidants, and nitrogen dioxide.

1965

38251

APTIC NO. 61097

Bernier, Axel

THE STRUCTURE OF TYNDALL SPECTRA. (Ueber die Struktur der Tyndallspektren). Text in German. Acta Phys. Austr., 21(1-2): 20-26, 1965. 4 refs.

The structure of the tyndall spectra of water and diocetyl phthalate aerosol is discussed with respect to the application of the tyndall spectra of monodisperse aerosols to the determination of the mean particle size. The calculations are based on the mie theory (scattering of electromagnetic waves by dielectric spheres). A certain relative particle size is characterized by the intensity variations of the scattered light as a function of the scattering angle. When using white light, the angular positions of red are usually used for determining the particle size. The curves of predominant red are found by connecting the points of the maximum red-to-green ratios along lines of equal particle size. In the region of backward scattering, the curves of predominant red are fragmented, and do not always have smooth transitions to the zone of forward scattering. For small particle size, the spectrum is characterized by the smooth curves of forward scattering, while the curves in the backward scattering area are increasingly modified with increasing particle size.

38252

APTIC NO. 60524

(Inventor not given.)

GAS DETECTOR. (Gasspuergeraet). Text in German. (Draegerwerk A. G., Luebeck (West Germany)) W. Ger. Pat. Appl. 1,598,332. 9p., Aug. 11, 1965. 11 refs. (6 claims).

The sampling unit of a gas and dust analyzing instrument is described. The sampling unit is composed of a bellow pump whose working stroke and return stroke are provoked by spring tension and a drive mechanism, in the form of a clockwork or electric drive, acting on the moving part of the bellows, respectively. The pressure in the bellow pump suction pipe is sensed by a pressure pickup which shuts the drive mechanism off whenever underpressure occurs in the suction pipe.

126

1961

38253

APTIC NO. 60675

Turk, Amos

OLFACTORY SENSING METHODS FOR PHYSICO-CHEMICAL MEASUREMENTS. Microchem. J. Symp. Ser., no. 1:167-180, 1961. 6 refs.

As a first basis for considering possible applications of olfactory measurements, the various aspects of odor perception are reviewed. These are odor intensity (related to the magnitude of the neural response caused by the odorant), odor quality (that property which identifies the odor through wide ranges of concentration), odor pervasiveness (the ability of a substance to odorize a large volume of space), and the hedonic value of an odor (its acceptability to people). The adsorption wave is the pattern of change of gas concentration during flow through an adsorbent bed; during adsorption, the wave pattern is continuously changing. The measure the adsorption wave by olfactory, the adsorption bed is separated into three increments and provided with odor ports for smelling on both sides of each increment. Using the Weber-Fechner law of perception which states that the olfactory intensity is proportional to the logarithm of the stimulus (odor concentration), the adsorption wave can be determined. The difference in efficiency between types of adsorbent beds depends on bed depth, degree of saturation, and type of adsorbent; efficiencies can range from 0-90%. The efficiency of an open-lattice activated carbon adsorber is 15%. These adsorbent beds can be used to produce air samples which are odor free to be used in olfaction studies. Olfaction is a rapid, inexpensive, and reasonably precise measurement method which can be applied to small quantities of matter.

AIR QUALITY MEASUREMENTS

1974

38254

APTIC NO. 61602

Dresia, Heinrich and Rolf Mucha

RECORDING RADIOMETRIC MEASUREMENT UNIT FOR THE COMBINED MEASUREMENT OF DUST EMISSIONS AND RADIOACTIVITY OF THE AIR. (Registrierendes, radiometrisches Messgeraet zur kombinierten Messung der Immissionen von Staub und Radioaktivitaet der Luft). Text in German. Staub, Reinhaltung Luft, 34(4):125-128, April 1974. 4 refs.

In the case of the radiometric dust measurement method, when using a carbon(14) beta radiation source and an end-window counter, measuring accuracy is great enough to have a measuring cycle of 1 hr under normal dust conditions. By transient screening of the beta source, the air activity deposited on the filter is measured in the same cycle. Measuring errors due to the moisture of the filter and sample are essentially reduced by preheating the air to about 90 C. As a result of short measuring cycles, the typical maximum values could be determined more clearly. Over a period of six weeks the dust emissions in the center of Essen, Federal Republic of Germany, were measured with the radiometric measuring unit. The sampling probe was positioned 1.5 m above the ground directly on the wall of a house 40 m from a main traffic artery. At times the radioactivity was measured. A typical increase of the dust emissions during the rush hour periods was confirmed. High dust emission concentrations in the first half of the night were recorded.

38255

APTIC NO. 61261

Fassina, Vasco

AIR POLLUTION IN THE HISTORIC CENTER OF VENICE. (L inquinamento atmosferico nel centro storico di Venezia). Text in Italian. *Inquinamento*, 16(1):21-27, Jan. 1974. 18 refs.

Results of sulfur dioxide and hydrochloric acid concentration measurements conducted in the historic center of Venice during 1972 and 1973 are presented and compared with those obtained in Florida. The sulfur dioxide concentration was measured by turbidimetry, using a hydrogen peroxide-containing bubbler and barium chloride as reagent for subsequent spectrophotometric measurement. The HCl concentrations were measured by colorimetry, using mercury thiocyanate and ferric perchlorate as reagents. The mean values of the SO₂ concentrations were 0.037 mg/cu m in June, 0.069 mg/cu m in August, 0.118 mg/cu m in September, 0.258 mg/cu m in November, and 0.207 mg/cu m in December, 1972, while the corresponding concentrations in January, February, March, April, and May, 1973 were 0.203 mg/cu m, 0.179 mg/cu m, 0.130 mg/cu m, 0.172 mg/cu m, and 0.107 mg/cu m. The HCl concentrations measured in 1972 were 0.22 mg/cu m in June, 0.014 mg/cu m in July, 0.026 mg/cu m in August, 0.028 mg/cu m in October, 0.022 mg/cu m in November, and 0.032 mg/cu m in December. In 1973, the HCl concentrations were 0.032 mg/cu m in January, 0.023 mg/cu m in February, 0.019 mg/cu m in March, 0.046 mg/cu m in April, and 0.050 mg/cu m in May.

38256

APTIC NO. 61566

Funashima, Masano, Kunihiko Asakuno, Tomio Hirono, and Toshio Ohira

HEAVY METAL POLLUTION IN TOKYO (REPORT NO. 2). (Tokyo-tonai ni okeru jukinzoku osen ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 5:11-18, March 1974. 2 refs.

Suspended particulates and heavy metal contents have been measured in Tokyo since 1969 by hi-vol samplers every 12 days for 24 hr. The monitoring locations were 14 metropolitan and suburban areas of Tokyo, including Ogasawara Island. The analyzed heavy metals were lead, chromium, nickel, vanadium, cadmium, manganese, copper, and iron, and atomic absorption spectrophotometry was used. The general tendency has been a steady decrease in concentration since 1969. The heaviest concentration of total dusts has been in the Koto district, where the measurement for 1969 was 444 micrograms/cu m and 270.5 micrograms in 1972. The most dramatic decrease was noted in the vanadium measurement in the same area, which decreased from 0.296 microgram/cu m to 0.034 microgram in 3 yr. One exception was Cd measurements in the Ota District which was 0.053 microgram/N cu m in 1969 and decreased to 0.037 in 1971, but increased to 0.063 in 1972. Lead additives in gasoline was cut down considerably in 1970, but the total number of automobiles increased; the total Pb emission by automobiles decreased by 2/3 in 1970. The Pb measurements in the air decreased greatly between 1969 and 1970, and again between 1970 and 1971; but the 1972 measurements everywhere show approximately the same level as 1971 or slight increases.

38257

APTIC NO. 61494

Georgii, Hans-Walter, Ulrich Jendricke, Dieter Jost, and Juergen Mueller

THE DISTRIBUTION OF HEAVY METALS IN CLEAN AND POLLUTED ATMOSPHERE. (Die Verteilung von Schwermetallen in reiner und verunreinigter Atmosphäre). Text in German. Staub, Reinhaltung Luft, 34(1):15-17, Jan. 1974. 6 refs.

The atmospheric lead concentration in cities is influenced by traffic. In areas remote of any traffic like on the Kleine Feldberg/Taunus and in St. Moritz, Switzerland the lead concentra-

tion measures 0.1 to 0.3 microgram/cu m, on the higher mountains in the neighborhood of St. Moritz and on the Island of Sylt it measures only 0.1 microgram/cu m. The cadmium concentration in the center of Frankfurt measured 0.06 micrograms/cu m, in the residential area of Frankfurt 0.03 microgram/cu m, on the Kleine Feldberg/Taunus 0.005 micrograms, in St. Moritz 0.009 and in Corviglia (altitude 2500 m) 0.008 micrograms/cu m. Lead concentration is very dependent on the wind speed. Simultaneous measurements of the lead and CO concentration yielded a close correlation which could be expressed by an empirical relation. The correlation coefficient Pb:CO in Frankfurt was 0.72. Due to this correlation the lead concentration can be approximately determined from the measured CO concentration.

38258

APTIC NO. 61495

Hartkamp, Heinrich

METHODS AND RESULTS OF MEASUREMENTS OF LEAD, ZINC AND CADMIUM IMMISSIONS IN LARGE CITIES AND IN THE VICINITY OF EMITTERS. (Methoden und Ergebnisse der Messung von Blei-, Zink- und Cadmium-Immissionen in Grossstaedten und in der Naehue von Emittenten). Text in German. Staub, Reinhaltung Luft, 34(1):12-15, Jan. 1974. 6 refs.

For the measurement of lead, zinc, and cadmium emissions particulate samples were taken by the Bergerhoff method, by the filter method developed by the Landesanstalt fuer Emissions- und Bodennutzungsschutz of the State of North Rhine Westphalia or by the Breuer-Abas-Tongeren filtering method. For the analysis of lead, zinc, and cadmium x-ray fluorescence spectrometry of a.c. rapid polarography was used. A description of these methods is given. Measurements were taken in a main traffic street in Essen, on a 30 m high building in the center of Essen, in the industrial area of the city in the North, and in the Southern residential area. In addition, measurements were taken in the vicinity of a zinc plant. The long and short-term emission concentrations were on the average between 0.8 and 2.2 microgram Pb/cu m and between 1.8 and 4.5 micrograms Pb/cu m. A characteristic diurnal or weekly fluctuation of the lead concentration was absent which indicates that, apart from traffic, other sources emit lead in considerable quantities. Cadmium concentrations of more than one microgram Cd/cu m were rare even in the neighborhood of cadmium producers. Average diurnal Zn concentrations of more than 10 micrograms were measured mostly in close proximity to the zinc plant. The lead and zinc concentration at the various measuring points depended on the wind speed, and on orographic conditions. A relationship was found between precipitations and the aerosol concentration which permits the estimation of aerosol concentrations with the aid of precipitation measurements.

38259

APTIC NO. 61493

Hettche, H. Otto

TEN YEARS TRACE ELEMENT ANALYSES AND ITS EVALUATION. (10 Jahre Spurenelementanalysen und ihre Bewertung). Text in German. Staub, Reinhaltung Luft, 34(1):17-18, Jan. 1974. 6 refs.

In the wake of the London smog episode of 1952 the emission concentration of benzo(a)pyrene and trace elements was determined in 50 districts. The results were compared with the lung mortality in these districts. A high correlation existed between lung cancer and the presence of benzo(a)pyrene, beryllium, and molybdenum. A somewhat lower correlation was found for zinc, arsenic, and vanadium. Similar measurements were taken in Hamburg in 1961. Annual averages of 2 mg/1000 cu m were found for lead, of 0.9 for zinc, and of 0.85 mg/1000 cu m for copper. In 1965 airborne dusts were analyzed in Bonn, Duesseldorf and Bochum. The high summer-time concentration of zinc in Bonn was striking. Duesseldorf had a high copper concentration in summer. In 1971 a measurement series was taken on the periphery of the Ruhr area. The samples

were collected on the roofs of schools in Oberhausen-Ostfeld, in Muelheim-Duempten 5 km to the South and in Kirchhellen 11 km to the North. Depending on the weather conditions, trace elements spread far. A correlation between zinc emission and bronchitis was found. This finding led to the installation of filters which reduced the Zn emission concentration to 1 to 2 mg/sq m.

38260

APTIC NO. 60434

Hishida, Kazuo

A SURVEY OF PUBLIC NUISANCES. (Kogai gairon). Text in Japanese. PPM (Japan), 5(5):2-22, May 1974.

The present condition of air pollution in Japan, pollutants, control methods, pollution formation mechanism, the effects of pollutants on human health and plants, and the national and local air pollution control programs are surveyed. Concentration of sulfur oxides in the air seems to be improving in some localities such as Tokyo, Osaka, and Fuji; in general, peaks appeared between 1965 and 1968, and gradual decrease of concentration started after that. New industrial cities that were not polluted in 1967-1968 are now developing heavier concentration of SOx. Of the 275 monitoring stations, 12 stations show increases in SOx concentration, 117 stations show a decrease, and 146 stations show a tendency to remain at the same level. Suspended particulates levels generally began to decrease about 1969. Carbon monoxide also reached the peak in 1969 in Tokyo and Osaka. Pollution by NOx and hydrocarbons is progressing in all areas. The number of NOx monitors is still small; i.e., 34, including mobile monitoring stations. There is no correlation between NOx and SOx levels. The measurements of NOx range from 0.02 ppm to 0.064 ppm. Carbon monoxide concentrations in Tokyo show a tendency to decrease after 1969, and the yearly average now ranges from 4.2 to 5.8 ppm.

38261

APTIC NO. 61576

Katayama, Tetsuo, Masayoshi Okamoto, Junji Koezuka, and Hiromi Yoshida

CONTINUOUS MEASUREMENT OF TOTAL SULFUR COMPOUNDS AND SULFUR DIOXIDE IN THE AIR. (Taikichu no zenjo kagobutsu to ariyasan gasu no renzoku sokutei). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 691, 1972. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G36.)

In the process of a long-term continuous monitoring of sulfur dioxide and total sulfur compounds by flame photometric detector and coulometry, a relatively high measurement of S compounds other than SO2 was noted. The monitoring point was in Kawasaki, 15 m above the ground. The total sulfur compounds minus SO2 measurements for June and July are presented in graphs. The time changes of SO2 and total S generally agree, but the ratio of SO2 in total sulfur compounds is 40-80%, and was much smaller than expected. Other S compounds were less than 20% in June, but between 20 and 60% in July. The correlation between SO2 and total S by 15-minute interval measurements was very good and were 0.97, 0.96, and 0.97 in three 8-hour segments of the day. Gas chromatographic analysis showed that the level of hydrogen sulfide was relatively high. The number of photochemical smog warnings and victims were: one affecting 15 persons in June, and 11 affecting 315 persons in July.

38262

APTIC NO. 61532

Kusumoto, Akiko and Toshio Sotoyama

PARTICLE SIZE CHARACTERISTIC OF SUSPENDED PARTICULATE IN URBAN AIR. (Toshi taikichu fuyufunjin no ryukei tokusei). Text in Japanese. Nihon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):101, April 1974. (Presented at the Japan. Society for Hygiene, General Meeting, 44th, Nagasaki, Japan, April 2-4, 1974, Paper 206.)

In order to determine the particle size characteristics of suspended particulates in urban air, the suspended particulate concentration, the mass median diameter (MMD), and the geometrical standard deviation (GSD) were measured for a year after December 1972 using a cascade impactor for 7 days of continuous and simultaneous sampling at three places in Tokyo, Fukagawa in Koto-ku, Yagumo in Meguro-ku, and Shinano-machi in Shinjuku-ku. The total concentration of suspended particulates varied in the range of 30 to 200 micrograms/cu m and was higher in the Fukagawa area than in the others. The values of MMD were in the range of less than 5 micron during the year of measurement and there were little differences between the areas. The values of GSD varied to a maximum of 20 and showed a clear regional difference. In the case of the Fukagawa area where the total concentration of suspended particulate is high and the values of GSD are great it is estimated that in spite of no difference in MMD between the areas, a high concentration of fine respirable dusts are contained in the suspended particulate.

38263

APTIC NO. 60370

Lahmann, Erdwin and Karl-Ernst Prescher

RESULTS OF AIR POLLUTION MEASUREMENTS ON SUNDAYS WITH TRAFFIC BAN IN BERLIN. (Messergebnisse der Luftverunreinigung an autofreien Sonntagen in Berlin). Text in German. Bundesgesundheitsblatt (Berlin), 17(7):105-106, 1974. 6 refs.

Three measurement stations were set up in Berlin to measure emissions on Sundays on which traffic was banned. One was close to a main traffic artery, another was several hundred yards away, and a third was very far away from traffic. Carbon monoxide and nitrogen oxides were measured. There was a significant decrease of both pollutants. Carbon monoxide dropped by about 44% and NOx by about 63% compared to Sundays when traffic was normal. There was no measurable effect at the station remote from the traffic.

38264

APTIC NO. 61112

Lindner, J.

STUDY OF THE RE-USE OF MERCURY CONTAMINATED ROOMS. (Zur Frage der Wiederbelegung von quecksilberkontaminierten Raeumen). Text in German. Gesundh.-Ingr., 95(2):39-42, 1974. 7 refs.

In a former laboratory building the mercury concentration was measured to determine the degree of contamination in the rooms to decide on re-inhabitation possibilities. The mercury concentration in the air was measured with an atomic absorption analyzer and sampled by a 50 m hose located behind the cuvette. To absorb interfering substances, a scrubber filled with concentrated sulfuric acid and a tube with magnesium perchlorate preceded the cuvette. Close to the floor 5 mg Hg/cu m air were measured, 1.60 m above the floor 0.05 to 0.1 mg Hg/cu m were measured, and 2.50 m above the floor 0.02 mg Hg/cu m.

38265

APTIC NO. 61569

Matsuyama, Takuzo

AIR POLLUTION WITH DUST. (Funjin ni yoru taiki osen). Text in Japanese. Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 11(1):40-42, Feb. 1974.

Air pollution in Amagasaki, Hyogo Prefecture, has been remarkably alleviated in the recent few years due to a number of air pollution control measures including the switchover to use of low-sulfur fuels, the rapid increase of desulfurization facilities installed in the major industrial plants in the city, and the stepped-up propagation of electrostatic precipitators and large bag filters. The city is known for the largest number of patients officially recognized as suffering from air pollution-caused diseases. Compared with the 1969 annual emission of sulfur dioxide estimated at 9 tons, the SO2 emission this year should amount to less than 3 tons. The suspending dust is now

reduced to the 1/2 - 1/3 level of the previous concentration. Despite the reduction achieved to conform to the environmental standards, the number of the air pollution-caused patients tends to increase. This may be due to the composite effect of SO₂ combined with dust. The respirable dust measuring 3 micron or smaller in diameter accounts for 60% of the suspended dust. Mainly composed of carbon black and metal fume, the respirable dust has a greater surface area and is therefore considered to have greater adsorption and catalytic power. An analysis of the suspended dust in Kawasaki showed that the dust contained 5-12% sulfuric acid and 1-2% nitric acid either adsorbed or deposited. The concentrations of these acids calculated on basis of the total volume of particulates are several hundred times higher than the environmental SO₂ standard set up as 0.04 ppm. And this respirable dust is inhaled into the respiratory organs. The much greater harm the multiplied or geometrical effect caused by SO₂ combined with the dust does to human beings has been clinically proven. A comparison between the effects of SO₂ alone and those of the dust having adsorbed SO₂ is given in a table. For prevention of the diseases caused by the air pollution, therefore, it may be a better idea to remove the suspended dust thoroughly by dust collectors rather than to desulfurize the emissions by costly desulfurization processes.

38266

APTIC NO. 61240

Nakano, Michio

AIR POLLUTION CONTROL BASIC PLAN IN OSAKA
(I). (Osaka-shi no taiki osen boshi kihon keikaku (I)). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 48(4):136-143, April 1974.

The 1971 environmental standards had been reached in Osaka by the end of 1972. With the revision of standards issued in May 1973, greater enforcement is planned in Osaka by a general control program. With regard to the sulfur dioxide standard, all monitoring stations fail to pass the new standard of daily average less than 0.04 ppm and hourly average less than 0.1 ppm. The daily average is achieved 75.2% of the time at best and in the worst area only 42.9% of the time. The standard of daily averages for nitrogen dioxide based on hourly measurement is less than 0.02 ppm. The ratio of failure in Osaka is 98.7% yearly, and even the best area exceeds the standard by 87.6%. The standard for suspended particulates is 0.10 mg/cu m or less per hour per day, and for hourly measurement is less than 0.20 mg/cu m. The 12 monitoring stations show by their 1972 figures from 5.1% to 73.6% failure rate. However, suspended particulates are now decreasing. Carbon monoxide hourly average per day is less than 10 ppm, and the 8-hour average of hourly measurement is less than 20 ppm. The daily hourly average was achieved by all eight monitoring stations in 1972, but only one district met the standard of hourly measurement. The environmental standard for photochemical oxidants is 0.06 ppm/hr without the effects of NO_x. But in summer, high concentrations have been noted frequently.

38267

APTIC NO. 61482

Tomingas, Rene and Arthur Brockhaus

POLLUTANT CONCENTRATION MEASUREMENTS IN DUSSELDORF ON SUNDAYS WITH TRAFFIC JAM.
(Immissionsmessungen an Sonntagen mit Fahrverbot an einer Messstelle in Duesseldorf). Text in German. Staub, Reinhaltung Luft, 34(3):87-89, March 1974.

The concentration of suspended matter, of sulfur dioxide, lead, cadmium, and benzo(a)pyrene was measured at the end of 1973 at a measuring point in Duesseldorf on four consecutive Sundays on which the use of motor vehicles was prohibited, and on two subsequent working days after every Sunday. The average values for 24 hr for all components vary every day as a result of meteorological influences, so that the relationships with the emission structure are not clear. By compiling the measured values for Sundays and working days,

and by comparing the components, it was possible to prove there was a decrease in the emission of Pb of about 50%. (Author summary modified)

38268

APTIC NO. 61533

Tsuchiya, K., M. Sugita, Y. Seki, Y. Kobayashi, and T. Umezawa

LEAD IN THE AIR OF TOKYO METROPOLIS -- 1/3 SEASONAL AND LOCAL VARIATION. (To-kyo-to ni okeru taikichu namariyo -- Kisetsu oyobi ba-zoo ni yoru hendo). Text in Japanese. Nihon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):134, April 1974. (Presented at the Japan. Society for Hygiene, General Meeting, 44th, Nagasaki, Japan, April 2-4, 1974, Paper 279.)

The quantities of lead and total dust in the air of six central areas, four outlying areas, and one island area in the Tokyo metropolis were measured for 13 months from September 1971 to September 1972. Measurements were taken three times a week and also continuously monitored by high volume samplers 6 to 7 m from the ground surface. The filter soaked in a nitric acid solution, and the lead dissolved in the solution was determined by polarographic analysis. The average value of lead in the eastern part of the central area of Tokyo was 1.16 micrograms/cu m, a comparatively high value, and in the western part was 0.83 micrograms/cu m. The lead values in the four outlying and island areas were lower in the order of the Tama area including Tanashi, Machida, and Hachioji, the Okutama area including Itsukaichi, and Hachijo island, which had the lowest value of 0.02 micrograms/cu m. The seasonal lead value was the highest, or about one microgram/cu m, from October to January, and on the whole there was a high relationship between the lead value and the total dust. This can not be explained by automobile exhaust and may suggest that it is caused by the increase in the quantity of dust due to the increased seasonal wind.

38269

APTIC NO. 60445

Varkonyi, Tibor

SULFUR DIOXIDE POLLUTION CHARTS IN INDUSTRIAL REGIONS IN TRANSDANUBIA (HUNGARY).
(Kendioxid-szennyezodesi terkepek a dunantuli iparvidekrol). Text in Hungarian. Energia Atomtech. (Budapest), 27(1):19-24, 1974. 1 ref.

Sulfur dioxide pollution charts of the industrial regions of Transdanubia, Hungary, a result of systematic SO₂ monitoring, are presented and evaluated. Both the background concentrations and the concentrations measured in industrial areas in summer and winter were highest in and around Budapest and in Northern Transdanubia. The background concentrations measured during the winter period were mostly in a range of 0.00-0.20 mg/cu m, but numerous values in the 0.20-0.50 mg/cu m range are indicative of regional pollution in some places. Most readings obtained for the summer period are below 0.10 mg/cu m, and the number of values exceeding 0.15 mg/cu m is negligible. In the industrial areas proper, the winter readings usually range from 0.20 to 0.30 mg/cu m, and the summer readings are in a range of 0.10-0.20 mg/cu m. During the winter periods values of around 1.00 mg/cu m, and even a maximum of 2.00 mg/cu m were recorded. The 40 mg/cu m limit was exceeded in only a few cases during the summer period.

1973

38270

APTIC NO. 61471

Aoki, Atsushi

TRACE ELEMENTS MEASUREMENTS BY THE NEUTRON ACTIVATION ANALYSIS OF AIRBORNE DUST. (Hoshaka bunseki ni yoru taiki fuyujinchu no biryo genso no kenkyu). Text in Japanese. Kyoto Furitsu Daigaku Gakujutsu Hokoku (Kyoto Prefect. Univ. Nat. Sci. Liv. Sci. Rept.), no. 24(B):17-21, Oct. 1973. 6 refs.

Trace element concentrations in the air were analyzed by neutron activation analysis. Suspended particulates were sampled at a relatively polluted area and a relatively unpolluted area of Kyoto city using membrane filters with pore sizes of 1.2 micron. The flow rate was 10 l/min and the filters were exchanged every half month. Samples were taken between July 1972 and June 1973, heated in an atomic reactor with neutron heat for 60 min, and the gamma ray spectrum was measured by a combination of an ORTEC 40 cu m germanium (lithium) detector and 1024 channel wave height analyzer, and concentrations of potassium, zinc, sodium, bromine, tungsten, lanthanum, cadmium, barium, rubidium, chromium, cerium, iron, antimony, silver, caesium, and cobalt were measured. The seasonal changes of suspended particulates and those of Br, Na, and Zn were examined. The results are presented in tables and graphs. The amount of K, Na, and Fe are much greater than other elements, but in the unpolluted area Zn had an extraordinarily high concentration. In the unpolluted area, concentrations of all elements but La, Fe, and Ag were greater; the amount of Br, Cr, Sb, and Zn were more than three times greater. Industrial sources of pollution in the unpolluted area were suspected to be the cause of these high concentrations. Seasonally, the concentration of suspended particulates increased in winter and spring in both areas, and the degree of increase was parallel. The annual averages were 0.12 mg/cu m at the unpolluted area and 0.065 mg/cu m at the polluted site. The Br concentration drastically fluctuated; and the antiknock agent in high octane gases were suspected to be the cause. The Br concentration in the air decreased slightly in 1973, showing a parallel tendency with the decrease of consumption of leaded gasoline.

38271

APTIC NO. 66495

Cerquiglini-Monteriolo, S. and R. Funicello

AIRBORNE LEAD: A STUDY OF SUSPENDED PARTICULATE MATTER IN URBAN AIR USING A SEM NON-DISPERSIVE DETECTOR. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp. Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 969-981, May 1973. 6 refs. (Oct. 2-6.)

Suspended particulate matter collected from urban air in a heavy traffic area was analyzed with a scanning electron microscope (SEM) combined with an x-ray spectrometer using a solid state nondispersive detector. Samples were obtained either by drawing the air through a membrane filter (mean pore size 0.45 micron) or with a cascade impactor. Detailed information on size, morphology, and elementary chemical composition for the single particles collected is presented, with special regard to the lead-containing particles. Data on the mass concentration of average suspended matter, Pb, carbon dioxide, nitrogen oxides, and hydrocarbons, determined at the same sampling site and during the same period, are reported to provide additional information. The comparison of the percentage of Pb-containing particles in the diameter range from 1-20 micron (5.5%) with the percentage from 1-3.5 micron (12%) proved that the number of Pb-containing particles increased as the diameter of the particles decreased. The Pb-containing particles with a diameter of 0.46 micron or higher were aggregates of Pb particles on other particles, probably of lithoidic nature. For a very substantial number of urban particles with a diameter of 0.4 micron or higher, the shape varied to a very large extent; the spheroidal and ellipsoidal shapes represented 51% of the total shapes present in the differential sampler fourth stage. This may be of interest in the theoretical calculation of the aerodynamic diameters used to define the diameter classes of fractions separated as a result of different falling speeds. The morphological study was extended to cover particles in the diameter range from 0.05 to 0.4 micron, where it is generally assumed that the percentage of those containing Pb is higher. The size distribution study on the total sample collected with the differential sampler established a clear-cut

predominance of the particles with diameters lower than 0.4 micron in the urban aerosol collected in a heavily trafficked street. (Author summary modified)

38272

APTIC NO. 66496

Chovin, P., J. Duffaud, F. Merkez, M. Favart, and L. Truffert
RESULTS OF A ONE-YEAR STUDY OF THE PARTICULATE LEAD CONCENTRATIONS IN THE AIR IN PARIS. (Resultats d'une année d'étude de la teneur en plomb particulaire de l'atmosphère de Paris). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1003-1014, May 1973. 6 refs. (Oct. 2-6.)

The lead concentrations in the air were measured at six sampling stations in Paris during the July 1971-June 1972 period. The monthly averages obtained for the six sampling stations are in the respective ranges of 0.8-3.2 micrograms/cu m, 0.8-2.9 micrograms/cu m, 1.2-4.8 micrograms/cu m, 1.6-6.5 micrograms/cu m, 0.4-2 micrograms/cu m, and 0.8-3.4 micrograms/cu m. The monthly averages were relatively low in July and August, somewhat higher in September and reached their maximum in October during the transport workers strike. The levels measured in November, December, January, and February were slightly higher than those in September, and the levels measured during the spring months were at the September level. The Pb concentrations were highest between 8 and 9 am, and lowest, but still considerable, between 2 and 4 am. Correlations between the Pb concentrations and the carbon monoxide concentrations with correlation factors of 0.53-0.73, and correlation between the Pb and nitrogen dioxide concentrations, with a correlation factor of 0.65, were established.

38273

APTIC NO. 66430

Deimel, Maria and Reinfried Gableske

MEASUREMENT OF VARIOUS EXHAUST GAS COMPONENTS OF AUTOMOBILE TRAFFIC IN COLOGNE. (Messung verschiedener Abgaskomponenten des Kraftfahrzeugverkehrs in Koeln). Text in German. Staedtehygiene (Uelzen/Hamburg), 24(12):268-272, 1973. 11 refs.

Since 1967 extensive measurements were taken in busy streets of Cologne to determine the extent of air pollution by automobiles. The measurements of carbon monoxide, lead, benzo(a)pyrene, and phenol taken between 1967 and 1970 are discussed. The carbon monoxide concentration was determined in 63 busy streets of Cologne and 14 street tunnels with an infrared analyzer. The measurements were taken between 6 am and 8 pm, 1.50 m above soil and about 10 to 15 m from traffic signals. The average annual CO load of all streets where measurements were taken was 12 ppm. In summer, the concentration was on the average 9 ppm lower than in winter. Of the 63 streets, three measured average CO concentrations of 20 to 25 ppm, five measured an average concentration of 15 to 20 ppm, 30 of 10 to 15 ppm, and 25 streets less than 10 ppm. Short-term peak concentrations were frequently above 100, some even above 200 ppm. In street tunnels, the concentrations were about 30% higher than those measured in streets. Between February and April 1970, dust samples were collected in 34 busy streets, two quiet streets, and 11 street tunnels at 1.80 m above the street curb, and the lead concentration determined. For sampling, a gravikon sampler was used preceded by a glass fiber filter. Between 6 and 8 pm, an average lead concentration of 4 to 5 micrograms/cu m air was measured. Hourly averages of more than 10 micrograms/cu m were determined for five of the 34 streets. The average lead concentration in street tunnels was 6 to 7 micrograms/cu m. Between 1969 and 1970 the benzo(a)pyrene concentration was measured in 45 streets and 10 street tunnels by taking random samples between 6 and 8 pm. At an average traffic density of 1000 vehicles/hour an average benzo(a)pyrene concentration of 3-16 microgram/cu m was determined for the summer months and

of 13 to 110 micrograms/cu m for the winter months. Average phenol concentrations of 0.02 to 0.03 mg/cu m and peak values of higher than 0.08 mg/cu m were measured.

38274

APTIC NO. 60497

Facchetti, S. and P. Garibaldi

THE LEAD ISOTOPIC COMPOSITION DETERMINATION FOR THE IDENTIFICATION OF ENVIRONMENTAL POLLUTION. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 995-1002, May 1973. 9 refs. (Oct. 2-6.)

Isotopic ratios in samples of lead present in air particulate, soil, grass, leaves, tree rings, and industrial products such as additives to gasoline and coal are reported. Their differences, either for literature values or for samples measured, very often gave results higher than the precision of the measurements. As the isotopic composition in the rocks and in the ore deposits changed according to regions, there was a variety of isotopic ratios due to the origins of the Pb used. It is therefore possible to either use minerals of one origin only to trace the main source of the pollution or to proceed with a systematic sampling of the various Pb sources in the areas under check. (Author summary)

38275

APTIC NO. 60494

Fugas, M., B. Wilder, R. Paukovic, J. Hrsak, and D. Steiner-Skreb

CONCENTRATION LEVELS AND PARTICLE SIZE DISTRIBUTION OF LEAD IN THE AIR OF AN URBAN AND AN INDUSTRIAL AREA AS A BASIS FOR THE CALCULATION OF POPULATION EXPOSURE. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc. Int. Symp. Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 961-968, May 1973. 6 refs. (Oct. 2-6.)

A realistic evaluation of the total exposure to lead in the air of certain population groups during their various outdoor and indoor activities was made. Outdoor Pb samples were collected in the city of Zagreb, around a Pb smelter, and in rural areas. Indoor Pb samples were collected in Zagreb and at the smelter. Personal Pb samples were also collected for Pb industry workers, persons working near streets and crossings, and city dwellers. The size-weight distribution of Pb in outdoor air and respirable Pb fraction in occupational exposure were determined. The exposure of an average citizen is not necessarily well represented by the average Pb in air concentration of the area in which he lives. Some populations are exposed to comparable weighted-average concentrations of Pb in air, which could not be concluded from the data on occupational or urban exposure only. (Author summary modified)

38276

APTIC NO. 61266

Fujii, Toru, Toshihiro Akashi, Yoshio Ihata, and Kiyoshi Imamura

STUDIES ON THE LOCAL AIR POLLUTION -- (3) AIR POLLUTION IN THE SOUTH AREA OF TOYONAKA CITY, OSAKA PREFECTURE (REPORT 2). (Genkyokusei taikiosen ni kansuru kenkyu -- (3) Osaka-fu Toyonaka-shi nambuchiku ni okeru taiki osen (Dai 2ho). Text in Japanese. Osaka-fu Kogai Kanshi Senta Chosashitsu Kenkyu Hokoku (Proc. Res. Sect., Osaka Environ. Pollution Control Center), no. 4:47-71, Dec. 1973. 3 refs.

The south area of Toyonaka City is known for high rates of chronic bronchitis. This is a second serial of the report in which the results of the air pollution survey conducted for April, 1972 through March, 1973 were summarized. The survey items included sulfur oxides, suspended granular substance, and meteorological conditions. The measured values of these

substances for each of the days covered in the survey period, their hourly changes taken for each month, their relations with meteorological conditions, and other pertinent information were recorded. Air pollution with sulfur oxides is high in the area while the hourly changes of sulfur oxides concentration shows a one-peak pattern, the concentration rising in the period from May to September. The wind direction in the area is generally NNE except the month of August when it is SSW. In winter, winds increase. The wind velocity is usually 3 m/sec. Higher concentration of sulfur oxides is observed when the wind direction is generally southerly and the wind velocity is around 2-5 m/sec. Concentration of suspended dust is generally high with a two-peak hourly fluctuation pattern. The sulfuric acid mist concentration is generally low while the fluctuation pattern. The sulfuric acid mist concentration is generally low while the concentration level of metal component in the atmosphere is higher for this area than other areas in Osaka Prefecture. The concentration of suspended dust also fluctuates drastically.

38277

APTIC NO. 58975

Garein, Michel

AUTOMOBILE EXHAUST-GENERATED AIR POLLUTION IN PARIS. (La pollution de l'atmosphère de Paris par les gaz d'échappement des véhicules automobiles). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc Eaux), 26(360):431-436, Nov. 1973.

Results of systematic measurements of the carbon monoxide, nitrogen dioxide, and lead concentrations generated by automotive exhaust emissions in the streets of Paris, are presented. Hourly averages and mean values for three 8-hour periods (6 am to 2 pm, 7 am to 3 pm, and 2 pm to 10 pm) were measured. The CO levels were highest between 7 am and 10 am, and between 5 pm and 8 pm. The maxima were lower during the morning peak, and on Saturdays. The CO emissions were lowest during August and September, which also shows good correlation between the traffic density and the CO concentrations. The 40 ppm and 30 ppm limits were exceeded in less than 1% and in less than 5% of all measurements, respectively, while the corresponding percentages for the 25 ppm and 15 ppm limits are 12% and 40%. The NO₂ concentration was highest between 2 pm and 6 pm. The 20 micrograms/cu m limit was exceeded in 89.3% of all measurements in 1972, up from 75.8% in 1969. The mean value of the hourly readings was 36.9 micrograms/cu m, up from 34.4 micrograms/cu m in 1969. The average Pb concentration was in a range of 2.8-0.9 micrograms/cu m, with extrema of 0.2 and 10.3 micrograms/cu m.

38278

APTIC NO. 60485

Guicherit, R.

ENVIRONMENTAL LEAD IN THE NETHERLANDS. SECTION A. STATUS REPORT ON THE OVERALL SITUATION. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 807-818, 831-833, May 1973. 9 refs. (Oct. 2-6.)

The results of studies on pollution patterns in urban, rural, and residential areas, along highways, in tunnels, and at frontier crossings are presented in terms of daily, weekly, and seasonal trends, and as frequency distributions. The influences of meteorological parameters, traffic density, and sampling location are described. The aromatic and lead content of gasoline sold in the Netherlands, air quality measurements in the various areas, the influence of highways on their immediate surroundings, the Pb content of water, and the absorption and excretion of Pb by adults living in the big cities are described. (Author summary modified)

38279

APTIC NO. 61563

Hamamura, Norikatsu, Tomokazu Tomita, Kazuma Ishida, Masanori Noma, Kiyokazu Mizoguchi, Mitsuyo Hayakawa,

Yoshikazu Shimizu, Kenji Nakamura, Hiroji Watanabe, Akira Moriya, Sukehiro Umemura, Shigeru Sugiyama, and Kenji Ito

ANALYSIS BY POLLUTION INDEX OF ATMOSPHERIC HEAVY METAL CONTENTS IN SOUTHERN INDUSTRIAL ZONE OF NAGOYA. (Pollution Index ni yoru Nagoya nanbu kogyo chitai no taikichu no jukinzoku ganyuryo no kaiseiki). Text in Japanese. Aichi-ken Eisei Kenkyushoho (Rept. Aichi Inst. Public Health), no. 23:35-44, March 1973. 4 refs.

The atmospheric concentrations of such heavy metals as zinc, iron, manganese, lead, cadmium, chromium, and nickel in the subject industrial district were measured and the air pollution with these heavy metals was evaluated in terms of the pollution index, the PI (pollution index) value of 1 representing the normal atmospheric concentration of a given heavy metal. The PI 1 value of each heavy metal is 5.0 micrograms/cu m for Fe, 1.3 for Zn, 0.19 for Mn, 0.54 for Pb, 0.02 for Cd, 0.02 for Cr and 0.09 for Ni. The PI 2 value is twice as high as the PI 1 value, and the PI 3 is three times as high. The PI 1 value of suspended dust is 0.25 mg/cu m. The FY 1970 survey was made from Dec. 1970 to Jan. 1971 covering five measuring spots while the 1971 survey covering 16 measuring spots was made from July, 1971 to March, 1972. The atmospheric concentrations of heavy metals were also measured at the Chita Health Center for over one year from June, 1971 through June, 1972. The monthly PI values for the respective heavy metals show that there is only negligible heavy metal pollution at the Chita Health Center area. But the Cr and Mn pollutions were extremely high around the A steel manufacturing plant where the maximum Cr value was 2.18 micrograms/cu m, or 109 in PI value, and the average Cr value was 0.90 micrograms/cu m, or 45 in PI. The pollution in the northern part of the neighboring Tokai City was influenced by that in the southern part of Nagoya.

38280

APTIC NO. 60493

Hartl, W. and W. Resch

LEAD CONCENTRATION MEASUREMENTS CONDUCTED IN AUSTRIA, AND EXPERIMENTS ON THE DETERMINATION OF THE PARTICLE SIZE. (Bleimessungen in Oesterreich und versuche zur Ermittlung der Korngrösse). Text in German. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 951-960, May 1973. 9 refs. (Oct. 2-6.)

Ten years ago, random lead measurements were begun in Austria. A systematic investigation was started in 1969 in the congested part of heavily traveled crossroads in Vienna. For this an automatic sampling device was used, which gave eight samples a day. In the course of two series of measurements (winter 1969/1970 and summer 1970) a total of 769 samples were analyzed for Pb. The results provided insight in to the average Pb concentration and its trend according to the time of day. Lead concentration was also determined at heights of 0.5, 4.2, 9, 14, and 19 m in the same place. The concentration decreased with increasing height; some 50% of the Pb still reached a height of about 19 m, approximately equivalent to the 5th-7th floor of a modern apartment building. Investigations were carried out at the motorway into the horizontal distribution of Pb. Four sampling devices were set up at right-angles to the roadway, one adjoining the verge and the others at a distance of 10, 30, and 100 m. In the latter position, 30% of the Pb concentration measured at the road verge was still present. This fact seems to have a considerable bearing on the future planning of trunk-roads. Measurements with a cascade impactor gave an indication of the size of atmospheric Pb particles; over 80% had grain sizes under 2 micron.

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38281

APTIC NO. 61543

Inoue, K., K. Imamura, K. Oka, F. Go, K. Taguchi, N. Tajima, Y. Tsujino, Y. Nishikawa, H. Hatanaka, T. Fujii, and K. Yoshimura

MONITORING THE ATMOSPHERIC DUST FALL AND SULFUR DIOXIDE BY LEAD CANDLE IN OSAKA PREFECTURE. (1972-nen (1-gatsu - 12-gatsu) kokubaijin narabini nisanakanamari-ho ni yoru arysungasu no sokutei kekka). Text in Japanese. Osaka-fu Kogai Kanshi Senta Chosashitsu Kenkyu Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center), no. 4:73-76, Dec. 1973. 3 refs.

The precipitating dust and sulfur dioxide in the atmosphere were continuously measured at 15 selected spots in Osaka Prefecture throughout 1972 (Jan. through Dec.). The total dust fall was measured by means of dust jars while the sulfur dioxide (SO₂) was measured by the lead dioxide (lead candle) method in which SO₂ was analyzed by a gravimetric method using barium sulfate precipitation with lead dioxide reagent. The measured concentrations of the precipitating dust and the atmospheric sulfur dioxide are shown tabulated by month. According to another table showing the yearly average values of the dust fall for seven of the 15 measuring spots, 1964 through 1972, it is indicated that the dust fall is decreasing notably, especially in more recent years. At the Koeiken measuring station, for example, it was 12.35 tons/mo/sq km for 1964, 14.50 for 1965, 14.85 for 1966, 14.96 for 1967, 13.81 for 1968, 10.83 for 1969, 9.44 for 1970, 8.69 for 1971, and 7.11 for 1972. The 1972 average value of the sulfur dioxide concentration was 1.00 SO₂ mg/day 100 sq cm for the Koeiken station. They were 0.41, 0.36, 0.71, 0.78, 0.69, 0.48, 0.36, 0.36, 0.50, 0.53, 0.56, 0.39, 0.25, and 0.38 for the other 14 measuring stations respectively.

38282

APTIC NO. 60492

Jost, D., J. Mueller, and U. Jendricke

LEAD IN ATMOSPHERIC AEROSOL. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 941-949, May 1973. 9 refs. (Oct. 2-6.)

The lead concentration in aerosol samples is strongly dependent on the thermal pretreatment of the sample. A considerable part of Pb is attached to small aerosols which may pass filters using the high volume method. Near traffic lanes, the influence of sampling height on the Pb concentration is well pronounced, whereas in residential areas there is almost no influence of height on Pb concentration. Lead and carbon monoxide concentration correlate well near streets; this correlation diminishes with increasing height. The diurnal variation of Pb concentration near streets is distinguished by the traffic pattern. In a residential area in Frankfurt, the Pb concentration shows a year-by-year increase up to 1970 (1.7 micrograms/cu m). Measurements in remote areas in the Alps were 0.02-0.1 and 0.06-0.6 micrograms/cu m. (Author summary modified)

38283

APTIC NO. 61219

Kodama, Yasuaki, Eisaburo Kunitake, Koichi Nobutomi, Masako Urabe, and Shin Ishinishi

ANNUAL VARIATION OF BENZO(A)PYRENE IN ATMOSPHERE OF NORTHERN KYUSHU DISTRICT. (Toshi taikichu ni okeru Benzo(a)pyrene oyobi kinzoku nodo no nenji henka ni tsuite). Text in Japanese. Taiki Oen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):519, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 249.)

The occurrence of benzo(a)pyrene in settling and suspended particulates and heavy metals in suspended particulates in in-

dustrial Kitakyushu and commercial Fukuoka for the period of 1966-69 and 1970-72 were compared. Two hi-vol samplers were set in two locations on arteries of the two cities and samples were taken for 3 continuous days, four times a year. For B(a)P quantitation, tar in the filter paper was extracted by the Soxhlet method and B(a)P was extracted and determined by alumina column, acetyl paper, and ultraviolet spectrometry. Metals were extracted by perchloric sulfide and measured by atomic absorption spectrophotometry; lead, manganese, iron, and cadmium were measured. The 1970-72 B(a)P measurement lost the seasonal variation pattern noted during 1966-69, and the measurements were generally low, 24.7 micrograms/sq m/mo compared to the previous 77.8 micrograms. Metals in suspended particulates were also much lower; the Pb annual average in Kitakyushu dropped from 4.68 micrograms/cu m to 0.76; Fe from 78.9 to 25.45, Mn from 1.91 to 0.50, and Cd from 0.14 to 0.034.

38284

APTIC NO. 60464

Lawther, P. J., B. T. Commins, J. Mc K. Ellison, and B. Biles. MORE OBSERVATIONS ON AIRBORNE LEAD. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 373-389, May 1973. 5 refs. (Oct. 2-6.)

Lead concentrations were measured at several sites in London including indoor and outdoor sites near highways, in residential areas, and in commercial areas. Electron microscope studies were made of aerosols from road vehicles collected at several roadside sites. The lead concentration was varied, as was the form of the particles that carry the particulate lead. The physical and chemical characteristics of the particles were determined by the conditions under which they were formed, which varied with engine design, state of maintenance, and operating conditions. An experimental engine on a test bed produced particles very similar to those that were collected in the general atmosphere which were attributed to the burning of leaded gasoline.

38285

APTIC NO. 61204

Matsuo, Kiyoko

A STUDY OF AIR POLLUTION AT WAKAYAMA CITY (PART 3). (Wakayama-shi no taikiosen ni tsuite (Dai 3 po)). Text in Japanese. Kishocho Kenkyu Jiho (Journal of Meteorological Research) (Tokyo), vol. 25:481-486, Dec. 1973. 3 refs.

An analysis is made of the concentrations of sulfurous acid gas and dust in Wakayama City with respect to wind direction and velocity. A telemetric observation system which measures acid dust and gas as well as wind direction and velocity every hour was used. A few cases of windward pollution are re-analyzed using the new data. Such windward pollution can be caused by the air pollutants first moving in the leeward direction with the south wind and gathering on the lee and then moving with the weak north wind to cause the seemingly windward pollution. The use of two testing sites showed that the wind direction was the same at a given altitude up to 300 m, while the wind velocity was very different even though the two sites were close to each other. Thus, it is not sufficient to consider only ground wind for analysis of the windward pollution mechanism. High concentrations of sulfurous acid gas were found around the Sumitomo Metal Mining Co. during the 1966-1967 period, but the concentration is now higher in the central part of the city than in the northern part.

38286

APTIC NO. 61579

Mitani, Kazunori and Masato Kondo

SIMPLE AND RAPID DETERMINATION OF 3,4 BENZOPYRENE IN DUST BY G.C. (Funjinchu no 3,4 benzopyrene no G.C.-ho ni yoru kani jinsoku teiryu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollu-

tion), 8(3):273, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 28.)

The most common carcinogen, 3,4 benzopyrene, was measured in the atmosphere and in the dusts of an electrode plant. The sampled dusts were collected by high volume sampler, and extracted by the Soxhlet method using benzene; tar was measured, dissolved in a given amount of benzene and analyzed by gas chromatography. This method and the method using cyclohexane and nitromethane were compared and the figures agreed well. For tar extraction solution, benzene and acetone were compared; there was no difference in the results. In the electrode plant, the maximum measurement was 2888.89 micrograms/air 1000 cu m, and 65.41 micrograms/1000 cu m in the lounge of the plant. In the air sampling taken at a traffic intersection, the average measurement was 13.04, ranging from 4.32 to 20.40 micrograms, and samples of ordinary air contained an average of 10.31 micrograms, ranging between 6.53 and 14.35. The BaP in tar is higher in the exhaust emission from a diesel engine than in a regular engine emission.

38287

APTIC NO. 58936

Okita, Toshikazu, Masao Mishima, and Masaharu Hitosugi

DISTRIBUTION OF PARTICULATE MATTER, METALS AND CL AT KASHIMA. (Kashima-cho ni okeru ryushijo busshitsu, kenzoku seibun oyobi enbun no bunpu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):329, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 256.)

The particulate size distribution in the air was investigated in the Kashima industrial area, Ibaraki prefecture. Hi-vol and low-vol samplers were used at five to nine locations in August-Sept. 1972 and Feb. 1973 in northern Kashima, and the total particulate quantity, chlorine ion, manganese, zinc, iron, cadmium, lead, tin, and copper were measured. Filter papers were changed every day between 9 and 11 am. The Cl ion was extracted by warm water and analyzed by mercury thio-cyanate, and other metals were extracted by 6 N nitric acid and atomic absorption spectrophotometry. The particle weight concentration ratio for high vol and low vol samplers was between three and eight, but in Kashima, where particle concentration is low, accurate weight concentration was difficult to obtain at the speed of 20 l/min. The relationships among microparticles and metal concentration, and the wind direction and velocity were examined with 24-hour measurements, but the relationships were very complex and no pattern was found. In 1972, there was a pattern between distance and concentration for Mn and Zn, and no relationship for others. In 1973, the reverse relationship was noted only for Zn.

38288

APTIC NO. 61165

Papesch, Ernst

COMPARISON OF THE MEASUREMENTS RESULTS OBTAINED WITH STATIONARY SO₂ MEASURING INSTRUMENTS SET UP IN GRAZ-CLOCK TOWER, VOITSBERG, KAPFENBERG AND BUCHENKOGEL NEAR WILDON. (Vergleich zwischen den Messergebnissen der stationären SO₂-Messgeräte Graz-Uhrturn, Voitsberg, Kapfenberg und Buchenkogel bei Wildon). Text in German. Umweltschutz-Staetereinig. (Vienna), 10:219-220, 1973.

Sulfur dioxide measuring units were set up in Graz, Voitsberg, Kapfenberg, and Wildon. An evaluation of the results obtained in winter 1972/73 yielded the following arithmetic mean concentrations, 0.24 mg SO₂/cu m in Voitsberg, 0.15 mg in Graz, 0.11 mg in Kapfenberg, and 0.06 mg in Wildon. In January 1973 the monthly average in Voitsberg from 31 daily averages was 0.24 mg SO₂/cu m. The same monthly average was determined for Graz from 22 daily averages. Kapfenberg had a monthly average concentration of 0.19 mg SO₂/cu m determined from 30 daily averages and Wildon had a monthly

average of 0.07 mg SO₂/cu m. The area Voitsberg-Koeflach with a total population of 23,600 generally measured a higher SO₂ pollution than Graz with a population of 248,500. Voitsberg-Koeflach are well ventilated by winds which cannot be said of Graz. Thus the major source of SO₂ in Voitsberg-Koeflach must be industry in spite of high stacks.

38289

APTIC NO. 60499

Rondia, D. and J. De Graeve

CONCENTRATIONS OF LEAD IN THE AIR OF A LARGE URBAN AGGLOMERATION IN BELGIUM. (Concentration du plomb dans l'air d'une grande agglomération Belge). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1015-1021, May 1973. 3 refs. (Oct. 2-6.)

The concentration of lead particles in the air was measured in an urban area of Belgium in 1968 and 1969 by taking large samples over an average period away from heavily trafficked areas. The measurements were made by spectrophotometry. The average concentration of Pb was between 0.5 and 1 microgram/cu m; it did not vary appreciably with the seasons, in contrast with the total number of particles in suspension in the air, but the figure for one sampling point could be as much as twice the figure at another point. In the same way, the maximum concentrations over a 24-hour period were on the order of twice the average concentrations.

38290

APTIC NO. 61209

Rondia, Desire

THE SULFUR DIOXIDE-SMOKE MONITORING NETWORK IN LIEGE PROVINCE. (Le réseau de contrôle soufre-fumées dans la province de Liege). Text in French. Ann. Mines Belg., no. 10:1141-1155, Oct. 1973. 6 refs.

The sulfur dioxide and smoke monitoring network installed in Liege Province, Belgium, with sampling stations primarily in the five biggest cities and in industrial areas, as well as SO₂ and smoke concentration measurement data obtained for area monitored are described. Following bubbling through aqueous hydrogen peroxide solution, SO₂, along with other acidic compounds, is determined by alkaline titration in aqueous solution. The non-selective reflectometric method, using a Whatman No. 1 filter and electric eye, is used for the determination of particulate matter. The sampling frequency lies at 1/24 hr. An analysis of measurement data gathered during the last years shows a slight reduction in the yearly SO₂ concentration, and a considerable reduction in the respirable dust concentration. The SO₂ concentrations measured during the winter periods were in correlation with the ambient temperature, while industrial SO₂ emissions were predominant in the summer. The share of domestic heating in the SO₂ concentrations measured in winter was 50 to 70%. The SO₂ concentrations measured in winter in urban and industrial areas were well above the maximum allowable concentrations. The SO₂ concentrations measured in the summer periods were higher in industrial areas than they were in urban areas.

38291

APTIC NO. 61477

Takahashi, Minoru. Yoshimasa Takahashi, Takiro Ichinotani, Takeshi Ozaki, and Taeko Okumura

A REPORT OF INVESTIGATION ON YELLOW COLORED FALLOUT IN AND AROUND AIRPORT (NO. 2). (Koku shuhen ni okeru oshoku rakkabutsu no chosa hokokusho (No. 2)). Text in Japanese. 46p., 1973.

Because a remarkable pollen fall has been found every year in the cities Toyonaka, Kawanishi, Itani, Ikeda, and Takarazuka, in and around Osaka airport, especially in the Katsube area in Toyonaka city and the Kushi elementary school area in Kawanaka City, a detailed investigation was made in 1973 of

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both cities. In addition, investigations and observations were made of yellow colored fallout at the airports of Yatsuo, Tokyo, Sendai, and Tottori in Japan, and at the Melbourne, Sydney, and Oakland airports. The investigating methods used were an opinion survey and tests for yellow-colored fallout on things such as the roofs of houses and cars, leaves, and white fabrics or polyethylene mats. The aggregation of pollen particles in and around airports is probably due to the passage of aircraft.

38292

APTIC NO. 61140

Tsunoda, Fumio

STUDIES ON FLUORINE. (Fusso ni kansuru kenkyu). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 26:77-81, Nov. 1973.

The procedure and results of an analysis of airborne fluorine compounds are reported. These are caught with two different kinds of filters and are classified into gaseous fluorine compounds, soluble particulate fluorine compounds, and insoluble particulate fluorine compounds. These are dissolved in suitable solvents and the eluted solutions are analyzed by the ion electrode method. The limit of this analysis is 0.02 microgram/cu m for gaseous fluorine and 0.01 microgram/cu m for particulate fluorine. Analyses have been made in Kawasaki City, Yokohama City, Niigata Prefecture, Gifu Prefecture, Osaka Prefecture, Matsuyama City, Sakaide City, Yatsudo City, and Kamaishi City.

38293

APTIC NO. 61538

Wolter, D.

CONTRIBUTION TO THE AIR HYGIENIC EVALUATION OF BITUMEN MIXING STATIONS. (Beitrag zur lufthygienischen Beurteilung von Bitumenmischanlagen). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 19(11):795-796, 1973. 4 refs.

The sulfur dioxide concentration, the respirable and non-respirable dust fraction, and the phenol concentration in the vicinity of a bitumen mixing station was measured. In the neighborhood of the plant were a food store and playgrounds for children. The measurements were taken between June and September 1972 at 100 to 150 m distance from a Hermey plant. The results show that neither the sulfur dioxide concentration nor the nonrespirable dust fraction exceeded the maximum allowable emission concentration. The limit value for respirable dust, however, was exceeded in 63.5 percent of all cases. Peak concentrations of 1.5 mg/cu m were measured which is ten times as high as the maximum allowable emission concentration. For phenol, 42 percent of the measured concentrations exceeded the maximum allowable emission concentration of 0.03 mg/cu m. The arithmetic mean value of all phenol measurements was 0.09 mg/cu m, the highest measured concentration was 0.18 mg/cu m. Similar results were obtained by measurements taken in the vicinity of Teltomat plants. Ten sulfur dioxide short-term measurements yielded concentrations between 0.03 and 0.14 mg/cu m SO₂. Fourteen phenol measurements yielded values between 0.02 and 0.45 mg/cu m.

38294

APTIC NO. 61549

Yanagisawa, Saburo

A REPORT ON INVESTIGATIONS ON ACTUAL CONDITIONS OF AIR POLLUTION IN AND AROUND TOKYO INTERNATIONAL AIRPORT. (Tokyo kokusaikoku shuhen ni okeru taiki osen jittai chosa hokoku). Text in Japanese. 54p., Feb. 1973.

The effect of the soot and smoke from the Kawasaki factory area on the air pollution of the Tokyo International airport and its environs, and the constituents contained in the exhaust smoke from aircraft, especially odorous substances, were investigated. The investigations were carried out for 3 days at 10 measuring places for carbon monoxide, at five places for nitrogen oxides, at three places for sulfur dioxide and formal-

dehyde, and at two places for floating dust. The methods of determining these substances were by nondispersion type infrared spectroscopy for carbon monoxide, the Saltzman liquid method for nitrogen oxides, the West-Gaeke method for sulfur dioxide, and the chromotropic acid method for formaldehyde. The floating dust was tested for heavy metals such as cadmium, lead, zinc, manganese, iron, cobalt, and nickel, and for nonmetals such as silicon, water-soluble substances, and organic substances such as benz(a)pyrene and pyrene. The 3-day average of carbon monoxide was 3.0 ppm, showing that the concentration of carbon monoxide was in general low; the 3-day average of nitrogen dioxide at five places was 0.063 ppm and no concentration difference between measuring places was shown; the 3-day average of SO₂ at three places was 0.022 ppm and that of formaldehyde was 0.022 ppm. These values are not significant.

1972

38295

APTIC NO. 61542

Aoki, Atsushi

NEUTRON ACTIVATION ANALYSIS OF AIRBORNE DUST. (Taiki fuyujin no chuseishi hoshaka bunseki). Text in Japanese. Kyoto Furitsu Daigaku Gakujutsu Hokoku: Rigaku, Seikatsu Kagaku (Kyoto Prefect. Univ. Sci. Rep.: Nat. Sci. Life Sci.), no 23:55-59, Oct. 1972. 4 refs.

Airborne dust was collected by air samplers equipped with membrane filters from January through June 1972 at two locations, one in the northern part of Kyoto City and the other in the southern part. The airborne dust so collected was analyzed by the above-described neutron activation method to determine the atmospheric concentrations of manganese, sodium, bromine, zinc, iron, antimony, and scandium. Concentration of the airborne dust as well as seasonal fluctuations of the manganese, sodium and bromine concentrations in the atmosphere were all observed through this analysis. The airborne dust concentration for the southern part of the city is twice as great as that for the northern part, while the bromine concentration is closely related to automotive exhaust gas.

38296

APTIC NO. 61528

Yanagisawa, Saburo

A REPORT OF INVESTIGATION ON ACTUAL CONDITIONS OF AIR POLLUTION IN AND AROUND OSAKA INTERNATIONAL AIRPORT. (Osaka kokusaikuko shuben ni okeru taiki osen jittai chosa hokokusho). Text in Japanese. 66p., Nov. 1972.

The actual conditions of air pollution were investigated for three days in June 1972 at 10 measuring places for nitrogen oxides, at five places for carbon monoxide, and twenty places for odorous substances, in the Katsube area of Toyonaka city adjacent to the runway B. Nitrogen oxides were determined by the Saltzman method, carbon monoxide by a nondispersion infrared gas analyzer, and odors by a gas chromatographic equipment with a hydrogen flame ionization detector. As a result, the 3-day average and the 1-hour values of nitrogen oxides for the 10 measuring places were 0.025 ppm and 0.004 to 0.064 ppm, respectively. In and around the airport there were cars and dust incinerators as sources of nitrogen oxides, and so the degree of the effect of aircrafts on air pollution in and around the airport still is unknown. The 3-day average and 1-hour values of carbon monoxide were 1.6 ppm and 0.5 to 3.5 ppm, respectively, which are negligible. As bad odors, aldehydes were detected, but the concentration too low to give out no bad odor. The aldehydes, judging from the ratio of the component of other hydrocarbons, seem to be due to both automobiles and aircraft.

38297

APTIC NO. 60977

Yurganov, L. N. and V. I. Dianov-Klovov

SEASONAL VARIATIONS OF THE ATMOSPHERIC CARBON MONOXIDE CONCENTRATION. (O sezonnykh variatsiyakh soderzhaniya okisi ugleroda v atmosfere). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(9):981-984, Sept. 1972. 1; refs.

The daily and seasonal variations of the atmospheric carbon monoxide concentrations were studied by absorption spectroscopy at a wave-length of 4.63197 micron at an observatory 60 km from Moscow. The daily variations of the CO concentrations were within a range of + or - 30%, and mostly within + or - 10%. No dependence of the CO concentration of the air humidity was observed. The study of the seasonal concentration variations revealed a rapid increase in the concentration beginning in mid-May, and a maximum lasting from early June until about June 20, after which period the concentrations became rather stable. An analysis of the concentration distributions as a function of wind direction showed no influence of automotive CO entrainment from Moscow city on the measured concentrations. However, there may be a certain relationship between the May peak and the very intense growth of the vegetation during the same period.

38298

APTIC NO. 60858

Minister fuer Arbet, Gesundheit und Soziales des Landes Nordrhein-Westfalen (West Germany)

EVALUATION OF ONE PART OF THE AREA CONCERNED. (Auswertung eines Teilgebietes des Erhebungsbereiches). Text in German. In: Emissionskataster Koeln. Bericht ueber den Stand der Modelluntersuchung im Grossraum Koeln zur Aufstellung eines Emissionskatasters fuer luftverunreinigende Stoffe, p. 71-118, 1972.

Results of an emission survey completed for one part of the Koeln emission survey area are evaluated, and pollutant concentration measurements performed in downtown streets in Koeln are reported. While domestic heating, trade, and traffic have equally large shares in the total CO emission, the share of industries is rather modest. Sulfur dioxide emissions are generated mostly by industries, and to a lesser extent by domestic heating and trade. Industry is chiefly responsible for nitrogen oxides hydrocarbon emissions. Dust is generated mainly by domestic heating and industry. On the basis of statistical analyses of pollution distribution patterns and of the frequency distribution of wind directions for a 25 km-long section of the survey area, the respective distributions of, and the respective shares of industry, traffic, and domestic heating and trade in the concentrations of CO, hydrocarbons, SO₂, and nitrogen oxides are presented in charts. Systematic measurements of the CO, SO₂, nitrogen oxides, and hydrocarbon concentration measurements in downtown streets in Koeln revealed average CO concentrations of 4-63 mg/cu m during daytime, and of 3-5 mg/cu m during the night, depending on traffic density. The SO₂ concentrations, calculated from the CO concentrations, averaged 6-43 micrograms/cu m during daytime, and 4-7 micrograms/cu m during the night. The calculated nitrogen oxide concentrations averaged 120-630 micrograms/cu m during daytime, and 70-140 micrograms/cu m at night, depending on traffic density.

1971

38299

APTIC NO. 60575

Kaller, R. and W. Rudolf

CONTINUOUS MEASUREMENT OF TRACE GASES. (Kontinuierliche Messung von Spurengasen). Text in German. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), Lufthyg.-Meteorol. Modelluntersuch. Reg. Untermain, 4th, Frankfurt am Main, West Germany, 1971, p. 40-46. (Nov. 4-5.)

135

Preliminary analysis of continuous sulfur dioxide and carbon monoxide concentration measurements being conducted in the Lower Main region within the framework of an air hygienic and meteorologic model study of that region is presented. The sampling stations, connected to a central computer for statistic data processing, data testing, and automatic instrument calibration, are arranged in such a manner that it is possible to determine the emission source in the knowledge of the measured concentrations and of simultaneously measured wind speed and wind direction data. The 30-minute averages of the SO₂ concentrations measured in Feb. 1971 were mostly in a range of 0.03-0.08 ppm. The SO₂ concentrations were highest between 8 and 11 am, and lowest between 4 and 5 pm. The average concentrations of SO₂ and CO, measured in Frankfurt am Main during a smog period in early Jan. 1971 were 223 ppb and 7.2 ppb.

38300

APTIC NO. 60574

Lahmann, E.

SPECIAL STUDIES IN AIR CHEMISTRY. (Bericht ueber spezielle luftchemische Untersuchungen im Raum Untermain in der Zeit von April bis Juni 1971). Text in German. Regionale Planungsgemeinschaft Untermain, 4th Frankfurt am Main (West Germany), Lufthyg.-Meteorol. Modelluntersuch. Reg. Untermain, Frankfurt am Main, West Germany, 1971, p. 36-39. (Nov. 4-5.)

The layout and preliminary results of air pollutant concentration measurements performed in the Lower Main region from April until June 1971 within an air hygienic and meteorologic model study of that region are presented. Three test stations with automatic air sampling for 1 hr each at 15-hour intervals by means of impingers for chloride, fluoride, and phenol concentration measurements, and three laboratory vans for one random sampling per month at each of the 43 sampling sites were used for the air pollutant measurements. Dust and lead concentration measurements were done in samples collected at 3 to 5 sampling sites for one sample within 3 to 5 hr. The sampling sites were arranged radially with Frankfurt am Main as a center, at increasing distances from the center city to the periphery of the investigation area. The average concentrations of sulfur dioxide, nitrogen dioxide, phenol, fluoride, formaldehyde, chloride, dust, and lead concentrations, obtained at the different sampling sites, were in the respective ranges of 30-126, 14-80, 2-5, 0.7-3.6, 4-33 and 4-93 micrograms/cu m, 0.18-0.23 mg/cu m, and 1.19-1.47 micrograms/cu m, respectively.

38301

APTIC NO. 60956

Mammarella, L., A. Biondi, M. Colacino, A. Guerrini, and F. M. Vivona

EVOLUTION OF URBAN AIR POLLUTION. (COMPARISON OF MEASUREMENT DATA OBTAINED FOR TWO DIFFERENT PERIODS IN AN EXTENSIVE RESIDENTIAL AREA). (Andamento dell'inquinamento atmosferico urbano (Comparazione dei valori di inquinamento interstagionali in un quartiere residenziale estensivo)). Text in Italian. Istituto di Fisica dell'Atmosfera, Rome (Italy), TR-35, 114p., Feb. 1971. 37 refs.

NTIS: N72-28647

Results of aerosol particle countings and sedimentation tests performed in the EUR section of Rome, an extensive residential and administrative area with ample green spaces, in the periods of Oct. 22-26 and Dec. 9-13, 1970, are presented. The aerosol measurements were performed by means of aerosol differential samplers and silicon oil-covered surfaces for settling tests. Five sampling stations were maintained. The major sources of aerosol pollution were automobile traffic during the fall period, and domestic heating during the winter period. The dust counts determined by means of the aerosol differential samplers during the morning hours, at noon, in the afternoon, and in the evening hours were in the October period and were in the respective ranges of 50,000-335,000;

40,000-170,000; 45,000-285,000; and 65,000-369,000. The corresponding particle counts determined during the similar periods in December were 120,000-1,010,000; 170,000-530,000; 220,000-820,000; and 180,000-1,000,000. The settling dust concentrations, determined by means of silicon oil-covered surfaces, ranged from 19,000 to 64,000. The below-5-micron fraction, the 5-15-micron fraction, and the above-15-micron fraction were 25-40%, 30-50%, and 15-20% of the total settling dust.

38302

APTIC NO. 61300

Yanagisawa, Saburo

A REPORT OF INVESTIGATION ON ACTUAL CONDITIONS OF AIR POLLUTION IN AND AROUND OSAKA INTERNATIONAL AIRPORT. (Osaka kokusaikuko shuben ni okeru taiki osen jittai chosa hokokusho). Text in Japanese. 74p., Oct. 1971.

The actual conditions of air pollution due to the exhaust gas from aircraft in Osaka International Airport were investigated for 3 days in August at ten measuring places for nitrogen oxides, at five blocks for carbon monoxide, and at nineteen places for odors in the Katsube area of Toyonaka city adjacent to a runway. The measuring methods used were the Saltzman method for nitrogen oxides, non-dispersive infrared spectrometry for carbon monoxide, and flame ionization detector for odors. The concentration of exhaust smoke from aircraft was measured. The 3-day average and the 1-hour value of nitrogen oxides for ten measuring places were 0.014 ppm and 0.02 to 0.038 ppm, respectively, which are below the Los Angeles environmental standard, the 3-day average and the 1-hour value of carbon monoxide for five measuring places were 0.2 ppm and 0.0 to 2.5 ppm, respectively, and the composition of aircraft exhaust smoke was clearly different from that of automobile exhausts. Aldehydes such as acetaldehyde, propylaldehyde, acrolein, benzaldehyde, and C₆ aldehyde were prevalent, and hydrocarbons were less important.

38303

APTIC NO. 60908

Environmental Protection Research Inst., Tokyo (Japan)

REPORT ON SULFUR DIOXIDE POLLUTION IN TOKYO IN 1969. (Tokyo-to ni okeru 1969-nen no arysan gasu osen no genjo hokoku). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:103-108, 1971.

The yearly fluctuations of averages of sulfur dioxide gas concentrations from 1955 through 1969, measured by electroconductivity automatic methods are presented in graphs. Of the eight monitoring stations, only the Kojiya station measurements have increased steadily and exceeded 0.08 ppm in 1969, which was twice as high as other stations. At the Metropolitan Government office, the yearly averages increased up to 1966, then began to decrease. It has not yet attained the environmental standard of below 0.05 ppm. At each location, the levels are higher in winter than other seasons, and generally low in spring and autumn. Kojiya has an extraordinary pattern and the high level continues from winter through summer, and in August, the monthly average exceeds 0.1 ppm, which is almost as high as winter levels. The predominant southerly wind in summer suggests that the primary emission sources are the adjacent Kawasaki and Tsurumi industrial areas. In other areas, the high concentration levels in winter is caused by heating systems. The daily fluctuation pattern at the monitoring station in front of the Metropolitan Government is a one-peak type with a peak forming between 8 and 12 noon in winter, and more than 0.1 ppm average continues from 8 to about 5 pm. In spring and summer, the peak forms later in the day, but never reaches 0.1 ppm. At the Kojiya station, the pattern is the two-peak type in all seasons. In winter the morning peak is higher than the afternoon peak, and in summer, the afternoon peak is higher. Except for autumn, the level is higher than 0.1 ppm between 8 am and 6 pm. At this monitoring station, the ratio of SO₂ level higher than 0.1 ppm was about 30% of the total hours in 1969.

1970

38364

APTIC NO. 60616

Mueller, Eleonore

EXPERIMENT AT AN EVALUATION OF THE DISTRIBUTION OF AIR POLLUTION IN GERMANY BASED ON VISIBILITY OBSERVATIONS. (Versuch einer Abschätzung der Verteilung der Luftverunreinigung in Deutschland aus Sichtweitenbeobachtungen). Text in German. Meteorologische Abhandl., 89(2):1-68, 1970. 34 refs.

The connection between visibility and the dust content of the air was studied using observations in Berlin-Dahlem. These quantities are inversely proportional to each other. Using this relationship, the degree of air pollution can be determined from estimates of horizontal visibility in several regions of Germany. While most meteorological stations observed visibility nearly continuously for many years, the dust content was measured irregularly at only a few stations. Therefore, it was desirable to use visibility as a quantity for the improvement of the poor data of dust content of the air and to investigate the geographic distribution of air pollution. In fact, the distribution of air pollution in Germany may be suggested by estimations of horizontal visibility. This is possible, because apart from humidity which can be considered extensive, other influences on atmospheric turbidity are small compared with dust content.

38365

APTIC NO. 60607

Stix, Erika

OCCURRENCE OF POLLENS AND SPORES IN THE AIR. (Vorkommen von Pollen und Sporen in der Luft). Text in German. Kommission zur Erforschung der Luftverunreinigung (West Germany) and Deutsche Forschungsgemeinschaft, Kolloq. Allerg. Pollen Sporen, Darmstadt, West Germany, 1970, p. 46-77. 8 refs. (April 14.)

Results of systematic pollen and spore counts conducted over several years in Darmstadt, Sylt, Harz, Gelsenkirchen, Hunsrueck, Mannheim, the Bavarian Forest, and the Black Forest in West Germany are presented. The sampling was done by means of automatic volumetric Burkhard traps. Yearly variations in the concentrations of *Alnus*, *Betula*, *Artemisia*, *Chenopodiaceae*, *Graminea*, *Plantago*, *Rumex* and *Urtica* pollens, and of *Boletus*, *Bulgaria*, *Cladosporium*, *Coprinus*, *Ustilago*, and *Ascomycetes* spores were observed. The concentrations of *Betula* pollens and *Cladosporium* spores showed daily variations. In general, the pollen concentrations were highest during spring and summer, and the spore counts were highest during summer and fall. Within one day, the pollen concentrations were highest during the noon and early afternoon hours, and the mycospore concentrations peaked at different times of the days. The *Betula* and *Graminea* pollen counts were dependent on the height above sea and on the meteorological conditions. Pollens of *Betula*, *Urtica*, *Graminea*, *Quercus*, *Pinus*, *Alnus*, and *Fagus* were predominant in the Darmstadt area. The results of the 4-year counts conducted in Darmstadt were compiled in a pollen and spore catalog including 18 pollen types and 6 mycospore types.

ATMOSPHERIC INTERACTION

1974

38366

APTIC NO. 58918

Bauer, Ernest

DISPERSION OF TRACERS IN THE ATMOSPHERE AND OCEAN: SURVEY AND COMPARISON OF EXPERIMENTAL DATA. J. Geophys. Res., 79(6): 789-795, Feb. 20, 1974. 29 refs.

Experimental data on the dispersion of clouds of inert tracers in the atmosphere are presented as a function of time after injection for a variety of altitudes from the planetary boundary layer to the turbopause and for times ranging from minutes to months; results on horizontal dispersion are compared with similar data for the upper ocean (depths less than 60 m). All of the data show a strong scale dependence of the effective eddy diffusivity. There is no explicit altitude dependence of the effective mean eddy diffusivity at a given length scale within the wide range of variability of the data in the lower atmosphere (0-30 km), and all of the data (for lower atmosphere, upper atmosphere, and ocean) show a scale-dependent horizontal eddy diffusivity with a similar dependence on cloud size. Absolute differences between atmospheric and oceanic diffusivities are related to a variation in mean values of the turbulent dissipation rate, and comparison is made with the classical analysis of Richardson. (Author abstract modified)

38367

APTIC NO. 61125

Beard, K. V. and S. N. Grover

NUMERICAL COLLISION EFFICIENCIES FOR SMALL RANDROPS COLLIDING WITH MICRON SIZE PARTICLES. J. Atmospheric Sci., 31(2):543-550, March 1974. 24 refs.

Numerical calculations are conducted to determine collision efficiencies between small raindrops and micron-size particles based on a numerical description of the axisymmetric steady-state flow about a rigid sphere for drop Reynolds numbers 1, 10, 20, 100, 200, and 400. The particle is assumed to move with a Stokes-Cunningham resistance to motion in the unperturbed flow of the drop. The results for drop radii between 40 and 600 micron and particle radii greater than or equal to 1 micron, the ratio of the latter to the former being less than or equal to 0.1, are intermediate to previously calculated collision efficiencies for the potential and viscous flow limits and do not follow the Langmuir interpolation formula. Comparison with experimental results shows good agreement when electric forces are unimportant. A new interpolation scheme is presented for the present results as well as for the potential flow case for larger raindrops which may be evaluated either graphically or by computer for a range of atmospheric conditions of 800-1100 mb and 0-30 C. (Author abstract modified)

38368

APTIC NO. 61235

Boatman, Joey F. and August H. Auer, Jr.

INADVERTENT THUNDERSTORM MODIFICATION BY AN URBAN AREA. Preprint, American Meteorological Society, St. Louis, Mo., 7p., 1974. 12 refs. (Presented at the Conference on Weather Forecasting and Analysis, 5th, St. Louis, Mo., March 4-7, 1974.)

Results of analysis of meso-scale data are presented indicating that local variations of temperature and moisture over the metropolitan St. Louis area can serve to modify thunderstorm characteristics. The St. Louis urban complex is a surface source of drier air than surrounding rural areas, and the use of equivalent potential temperature reveals that surface potential for convective energy release is less over the urban complex than its rural counterpart. Urban air of less convective energy enters thunderstorms, and these storms exhibit associated decreases in overall intensity. Intensity parameters decrease as thunderstorms pass over the urban complex and then increase, reaching or surpassing their upwind rural values. (Author conclusions modified)

38369

APTIC NO. 61118

Chi, S. W. and W. J. Glowacki

APPLICABILITY OF MIXING LENGTH THEORY TO TURBULENT BOUNDARY LAYERS BENEATH INTENSE VORTICES. J. Appl. Mech., 41(4):15-19, March 1974. 19 refs.

Mixing length theory is correlated with boundary layer data beneath intense vortices which often occur in natural atmospheric conditions such as tornadoes and dust devils. Boundary layer equations with turbulent eddy viscosity are developed in terms of a mixing length and an appropriate shear velocity by consideration of a simplified turbulent energy equation. An expression for the mixing length is first derived from the flat-plate data in the absence of quantitative knowledge of the mixing length for the vortex and is then modified for adaptation to the vortex flow. The full turbulent boundary-layer equations are finally solved on a high-speed computer, and the calculated results are compared with the available experiments under the same conditions. Mixing length theory is concluded to adequately represent the experimental data. (Author abstract modified)

38310

APTIC NO. 60985

Dannevik, W. P., S. Frisella, H. J. Hwang, and R. B. Husar

ANALYSIS AND CHARACTERIZATION OF HEAT-ISLAND-INDUCED URBAN CIRCULATION DURING THE 1973 EPA AEROSOL CHARACTERIZATION STUDY, ST. LOUIS, MISSOURI. Preprint, American Meteorological Society, p. 192-197, 1974. 4 refs. (Presented at the Conference on Weather Forecasting and Analysis, 5th, St. Louis, Mo., March 4-7, 1974.)

Aerosols were characterized in St. Louis, Mo., by a statistical analysis of extended recorded data. The field study took place during three intensive sampling periods of 30 hr duration between Sept. 5 and Oct. 4, 1973. The data sources, analysis procedures, characterization of local urban circulation induced by the heat island, and three-dimensional transport of locally-emitted contaminants are described. The heat island was typified by a surface temperature excess of 8 F. Late evening was a time for increased urban-rural temperature contrasts, because of differential longwave surface radiative cooling rates over the urban and rural areas and the increased storage of daytime heating by urban structures. The low-level stream-field correlated well with the position of the heat island center. The associated boundary layer wind profile indicated wind speeds less than 5 m/sec in the lowest km, and a veering of wind with height. Other heat island circulation characteristics were a 30 km diameter surface inflow region of influence, 1 km depth of circulation, 7 km diameter updraft region, 1-4 hr duration of circulation, 2 m/sec surface inflow velocities, 30 cm/sec inferred vertical velocity in updraft, and 10 to the 6th power cu m/sec resultant vertical volume flow rate in the updraft core. Determinations of the vertical distribution of the aerosol scattering coefficient, number density, size distribution, and sulfur dioxide concentration approximately 8 hr before and after the heat island circulation indicated a substantial buildup, subsequent to the organization of the local circulation, of aerosol loading in the layers between 3000 and 5000 ft. The important role of the heat island circulation in determining the ground level concentration distributions of pollutants was established by the SO₂ measurements.

38311

APTIC NO. 61109

Flechon, Jean and Ibrahima Toure

PREDICTING THE DIRECT SOLAR RADIATION INTENSITY IN CLEAR SKY AND IN ATMOSPHERE WITH LOW AEROSOL CONTENT. (Predetermination de l'intensité du rayonnement solaire direct par ciel clair et sous faible teneur de l'atmosphère en aérosols). Text in French. C.R. Acad. Sci. Paris, Ser. B., 278(9):365-367, Feb. 1974. 6 refs.

A method for the calculation of the direct solar radiation intensity of the atmosphere under clear skies and in an atmosphere with a low aerosol (water vapor) content is presented. The method is based on the distinction between two factors influencing the attenuation of the solar radiation in the atmosphere; a permanent and constant factor which is due to molecular diffusion and selective absorption by the permanent

constituents of air as defined for a given range of the solar spectrum; and another, fluctuating factor characterizing the status of the atmosphere in the presence of aerosols and water vapor, as defined for another band of the solar spectrum. Angstrom's turbidity coefficient is assumed to be in a range of 0.00-0.1. Good precision in the determination of the atmospheric transmission coefficient was determined. In the calculation of the transmission factor in connection with the fluctuating parameters of the atmosphere, the water vapor tension at ground level was of essential influence.

38312

APTIC NO. 61175

Fusari, Redo, Alfredo Murri, and Carlo Scuterini

STUDY OF THE PHYSICO-CHEMICAL CHARACTERISTICS OF THE PRECIPITATION IN THE ADRIATIC WATERSHED AREA OF CENTRAL ITALY. (Studio delle caratteristiche chimico-fisiche delle precipitazioni sul versante Adriatico dell'Italia Centrale). Text in Italian. *Inquinamento*, 16(1):16-20, Jan. 1974.

Systematic measurements of the pH value, conductivity, and sulfate ion concentrations in precipitation collected in Macerata, a small town with no industry in the Adriatic watershed area of Central Italy, are presented. The precipitation acidity has not changed markedly relative to the previous years, and is in line with measurement data obtained for other countries in Europe and North America. A slight decrease in the precipitation pH value is indicative of slight increase in the pollution level. The pH values were highest in summer, and lowest during the winter period. The sulfate ion concentrations ranged from 3.02 to 28.53 mg/l, the highest values being due to non-anthropogenic pollution. Close correlation between the precipitation sulfate ion concentration and its conductivity was established.

38313

APTIC NO. 60403

Galley, Robert A. E.

THE FACTORS AFFECTING THE DISTRIBUTION OF PESTICIDES THROUGHOUT THE ATMOSPHERE. *Chem. Ind. (London)*, no. 5:179-181, March 2, 1974. 17 refs. (Presented at the Physicochemical and Biophysical Panel and Pesticides Group of the Joint Symposium of the Society of Chemical Industry, London, March 6, 1973.)

Factors affecting the distribution of pesticides, especially organochlorine compounds, throughout the atmosphere are reviewed. The stability of DDT and other similar compounds accounts for their long-lived existence in air, water, and soil in small amounts until their relatively slow degradation is complete. Such pesticides can vaporize from falling spray particles and from plant, soil, and water surfaces; and they can be transported physically as vapor or adsorbed on windborne particles of soil or dust. Distance of transport depends upon climatic conditions. Where concentrations in the air are high during or immediately following spraying operations, they decrease rapidly to small values; large particles quickly fall to the ground, and very small ones are carried down wind. An estimated 8000 t of DDT is presently circulating round the world in the first mile above sea level.

38314

APTIC NO. 60376

Grennard, Alf and Fraser Ross

PROGRESS REPORT ON SULFUR DIOXIDE. *Combustion*, 45(7):4-9, Jan. 1974. 13 refs.

The sulfur cycle, from emission to absorption, is examined in an attempt to show that emission restrictions of sulfur dioxide are impracticable and unnecessary. Sulfur dioxide is only of local significance because it is rapidly absorbed by the ground surface and is converted to sulfate. Sulfur is removed from the atmosphere primarily by two mechanisms: the dry deposition of SO₂ and solution of sulfate in rain. Rain-out of SO₂ and deposition of sulfate do not occur to any significant extent. It is generally agreed that anthropogenic additions of sulfur com-

pounds to the atmosphere are still less than those of the natural sulfur cycle on a global basis, although there are local excesses, particularly in the northern hemisphere. The solution to the problem of excess concentration of SO₂ is to dilute it to acceptable concentration by a device such as a tall chimney. The effects of SO₂ on soil, plant growth, and lakes are reviewed with the conclusion that SO₂ emission reduction measures are unwarranted.

38315

APTIC NO. 61313

Hoeschele, K.

THE REPRESENTATIVENESS OF TEMPORAL RANDOM SAMPLES OF SOME METEOROLOGICAL PARAMETERS IMPORTANT FOR THE EVALUATION OF EMISSIONS. (Die Repräsentanz zeitlicher Stichproben einiger fuer Immissionsbetrachtungen wesentlicher meteorologischer Groessen). Text in German. Meteorol. Rdsch., 27(1):5-10, 1974. 11 refs.

The analysis of persistent meteorological characteristics, combined with the power spectra for periods between 2 and 60 days, partly by means of tetrachloric correlation methods, enables the calculation of standard deviations and confidence limits for long time means. Results are presented for air temperature, wind velocity, and wind direction measured in Karlsruhe, and for general weather situations in Central Europe. Because of high persistence, there is only a little increase in the standard deviation of the sample means with growing distances between observation days up to about 7 days.

38316

APTIC NO. 61256

Huertas, M. L., A. M. Marty, and J. Fontan

ON THE NATURE OF POSITIVE IONS OF TROPOSPHERIC INTEREST AND ON THE EFFECT OF POLLUTING ORGANIC VAPORS. J. Geophys. Res., 79(12): 1737-1743, April 20, 1974. 32 refs.

The nature of the clustering phenomenon around small tropospheric ions and the influence of traces of polluting organic vapors on hydronium ions are studied in a source chamber where ions are created in atmospheric air at pressures varying from a few torrs to 40 torrs. Ionic spectra are given for the following organic vapors: ethanol, acetone, ammonia, organic nitro compounds, relatively inactive vapors such as carbon tetrachloride, benzene and its monosubstituted derivatives, and some plant volatiles. The measurements show a progressive agglomeration of the ions, with protonation and hydrogen bonding apparently assuring the stability of the clusters.

38317

APTIC NO. 61174

Liberti, A., D. Brocco, and V. Canuti

ASSESSMENT OF AIR POLLUTION DUE TO TRANSPORTATION PHENOMENA. (Valutazione dell'inquinamento atmosferico dovuto a materiali di trasporto). Text in Italian. Inquinamento, 16(1):12-15, Jan. 1974. 5 refs.

The atmospheric sulfur dioxide and particulate matter concentrations, the sulfate content in particulate matter, and the pH value, sulfate, and ammonia contents of precipitation samples were studied at observation stations with very low background pollution in Italy to study pollutant transportation. The SO₂ concentrations measured at stations located 20 to 30 km from urban and industrial agglomerations showed considerable seasonal variations with maximum during December and January, while the SO₂ concentrations measured at stations with practically no pollution were both very low and constant. The sulfate content of the atmospheric particulate matter showed little variation. The rather low pH values of the precipitation samples from background stations (3.93 to 3.95) are indicative of pollutant transport phenomena. At pH values over 5, the sulfate-ammonia ratio fell to below 0.2.

38318

APTIC NO. 61384

Lomaya, O. V. and D. G. Tsintsadze

ANALYSIS OF THE DIURNAL COURSE OF AIR POLLUTION. (Analiz sutochnogo khoda zagryazneniya vozdukha). Text in Russian. Soobshch. Akad. Nauk. Gruz. SSR, 73(2):329-332, 1974. 7 refs.

Round-the-clock measurements of solid aerosol concentrations in the surface layer in Tbilisi were conducted, and the results were compared with diurnal changes of meteorological factors for the same period to obtain correlations between the respective courses of the aerosol concentrations and meteorological parameters. The solid aerosol concentrations had two maxima (at about 9 am and 7 pm), as well as two minima (at about 3 pm and in the evening). The diurnal course of the mean wind velocity also had its maximum around 3 pm, and also the vertical temperature gradient, facilitating turbulent exchange, was most intense around 3 pm. The daily variations in the aerosol concentrations were most pronounced on a sunny day, and there was little variation in gloomy weather. The daily extrema are due to corresponding changes in the meteorologic factors rather than to the rush hour emissions because extrema were observed also on Sundays and holidays.

38319

APTIC NO. 60418

Moriguchi, Minoru

DISPERSION OF SOOT AND SMOKE IN THE ATMOSPHERE. (Taikichu ni okeru baien no kakusan). Text in Japanese. PPM (Japan), 5(6):52-67, May 1974.

The phenomenon of smoke dispersion in all its aspects is discussed in detail with mathematical formulas, graphs, and diagrams. The topics include: dispersion types, the effects of topography, the effects of the weather, the atmospheric stability, inversion layer, wind speed, the wind vertical structure, local winds, turbulence, dispersion models, puff models, calculation methods, effective stack height, and dispersion parameters. On windy days, the smoke from a high stack is rolled to the back of the stack or behind a nearby building. This is caused by the whirlpool created in back of an obstacle for the wind and is called downwash. When the smoke is carried by the descending current produced by the building or terrain, it causes a downdraft. In either case, an unexpectedly high concentration of pollutant is created on the ground.

38320

APTIC NO. 61162

Moses, Harry

ARGONNE URBAN-RURAL AIRFLOW PROGRAM. Bull. Am. Meteorol. Soc., 55(2):112-114, Feb. 1974. 2 refs.

The Argonne National Laboratory participated in an urban-rural airflow program to study the effect of the urban complex upon the wind field in the planetary boundary layer. Information on the wind field was obtained by double-theodolite tracking of pilot balloons launched simultaneously from as many as nine sites within and surrounding St. Louis, Mo. Salient wind profile features were as follows: the low-level wind-speed maximum appeared at 200-400 m; rural wind speeds exceeded urban speeds in the lower layers, while a reversal occurred at the level ranging from 200-700 m; urban wind was directed toward lower pressure more so than the undisturbed flow due to greater surface friction and other local effects. Comparison of low-level jet features over the city and the country area showed that the height at which the average jet maximum occurred was approximately 150 m higher in the city, although the maximum speed did not appear to differ between the two areas. Wind variability, as measured by the ranges of speed and direction, was significantly greater over the city than over the rural areas. Additional analyses showed that the influence of the city with respect to wind variability may extend up to at least 1000 m, although the effect was diminished above 600 m. Values of the direction stage over the city were generally higher than for the rural area.

38321

Munemori, Shin

APTIC NO. 60435

CHEMISTRY OF URBAN ATMOSPHERE. (Toshi taiki no kagaku). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 23(2):215-221, Feb. 1974. 11 refs.

The composition of the atmosphere, and pollutants such as carbon oxides, sulfur oxides, nitrogen oxides, and suspended particulates are discussed. In the area of photochemical smogs, the time changes of pollutant concentrations and the reaction mechanism of photochemical smogs are chemically analyzed. In a pattern of changes, a drastic increase of hydrocarbons occurs about 9 am from 28 ppm to over 50 ppm; a gradual increase of aldehydes occurs from early morning to noon from 5 ppm to 30 ppm; nitrogen dioxide increases from 8 ppm to about 20 ppm at 8 am and drops drastically about 10 am; a relatively high concentration of nitric oxide early in the morning, about 13 ppm, decreases to 2 ppm about 10 am; ozone increases from about 5 ppm at 2 am to over 20 ppm at noon and remains at that level until about 3 pm. Hydrocarbons in the air compete with oxygen and react with oxygen atoms produced by photochemical degradation of nitrogen dioxide to yield HCO₂; HCO₂ combines with ozone, reacting to part of the NO and produces NO₂. The HCO₂ becomes mostly aldehyde. Thus, when NO is oxidized and NO₂ accumulates, O₃ accumulation increases drastically. Therefore, with an increase of NO₂, aldehydes increase and HCs decrease, but O₃ remains at a high level.

38322

APTIC NO. 60382

Richards, J. M.

BUOYANT PUFFS AND THE SIMILARITY ASSUMPTION. Atmos. Environ., 8(2):197-198, Feb. 1974. 5 refs.

Incompressible flow is considered without condensation or evaporation; and it is assumed that the distribution of fluid velocity is similar at all stages such that all velocities, including turbulent velocities, internal circulating velocities, and external subsidence velocities, are constant multiples of v , the velocity of puff center rise, and all volumes are constant multiples of a to the n power, where a is the radius of the puff, n being equal to 3 for an axial puff and n being equal to 2 for a two-dimensional puff such as a cross sectional slice of a bent-over plume. Equations of conservation of fluid volume and mass, of momentum, and of energy for the puff are then set forth, and an expression for the definition of entrainment velocity is presented. The assumption of similarity implies that the entrainment coefficient is constant since the entrainment is a kinematic property of the flow field. Other considerations concerning buoyant puffs and the similarity assumption are also outlined.

38323

APTIC NO. 61310

Schmidt, U. and W. Seiler

H₂ CYCLE IN THE ATMOSPHERE. (H₂-Kreislauf in der Atmosphäre). Text in German. Umschau Wiss. Tech., 74(9):284-285, 1974. 3 refs.

A comprehensive set of data on the hydrogen mixing ratio in the tropospheric air of the north Atlantic was used to investigate the cycle of this atmospheric trace gas. Apparently, the dominating sources of H₂ are the anthropogenic combustion processes which amount to more than 50% of the sources of global H₂ production. The high H₂ values in Mainz in the Federal Republic of Germany clearly show the effect of anthropogenic sources. The H₂ mixing ratio may rise to 4.0 ppmv in stagnating weather. It never dropped below 0.52 ppmv, a value which was also the lowest measured over the Atlantic.

38324

APTIC NO. 59293

Schneider, Stephen H.

ATMOSPHERIC PARTICLES AND CLIMATE: THE IMPACT OF MAN'S ACTIVITIES. Experientia Suppl., no. 20:17-30, 1974. 35 refs.

An increase in the number concentration and mass of suspended atmospheric particles as well as an upward trend in turbidity and a decrease in the average particle size appears documented for much of area in the northern hemisphere. Global average models of the radiation balance using reasonable estimates for aerosol optical properties indicate that an increase in the particle loading of the atmosphere could significantly increase the albedo of the earth's surface. Large-scale numerical models of the land-ocean-atmosphere system appear to require further development for determining how changes in the radiation balance from increased aerosols might evoke simultaneous variations in other atmospheric variables.

38325

APTIC NO. 61585

Senshu, Toshio

ATMOSPHERIC DIFFUSION OF SMOKE AND ITS CONTROL SYSTEM. (Karyoku hatsudenjo haiei no taiki kakusan to sono kanshi sisutemu). Text in Japanese. Karyoku Genshiryoku Hatsuden (Therm. Nucl. Power), 25(2):142-154, Feb. 1974. 12 refs.

Smoke diffusion from high stacks, diffusion models, atmospheric stability, and monitoring systems are discussed. Tracer experiments were performed to confirm diffusion models that were derived. Monitoring systems should collect data on local wind direction and velocity, vertical temperature distribution, and pollutant concentration. Methods of air pollution forecasting are described.

38326

APTIC NO. 61583

Shimogata, Shigeo

ATMOSPHERIC DIFFUSION IN NEUTRAL AND UNSTABLE SURFACE BOUNDARY LAYERS. (Churitsu oyobi fuantei-kyokaiso chu de no kemuri no kakusan). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 10(2):143-148, Feb. 1974. 25 refs.

A general function describing vertical smoke diffusion in the neutral, unstable, and constant flux layers of the atmosphere is discussed. This function varies depending on a coefficient which is dependent on the stability of the smoke; the coefficient decreases as conditions become less stable. Measurements of the plume behavior agreed well with calculations using this equation.

38327

APTIC NO. 61111

Sidorenko, V. F. and Y. G. Feldman

CALCULATION OF CARBON MONOXIDE CONCENTRATION IN AMBIENT AIR OF ROADWAYS AND SURROUNDING BUILDINGS. (O raschete kontsentratsiy okisi ugleroda v vozdukhe avtomagistraly i prilagayushchey zhiloy zastroyki). Text in Russian. Gigiena i Sanit., no. 1:7-10, 1974. 2 refs.

Empirical formulas for the calculation of the predictable carbon monoxide concentrations in the air of major roadways and in surrounding building blocks was derived from exhaustive CO concentration measurements. The empirical formula contains such factors as wind speed between 1 and 10 m/sec, the breadth of the roadway between 30 and 100 m, traffic density, the ratio of vehicles with diesel engines and spark ignition engines, mean speed, slope, and building layout. The CO concentration over the roadway is lowest at an average speed of 70 km/hr when gasoline engine-powered vehicles are predominant, and shifts of the CO concentration minimum to much lower speeds with the increase of the ratio of diesel engines. In case of contiguous row of buildings along the street, the CO concentration at the buildings is a direct function of the

distance from the curb, and that behind the buildings amounts to 15m50% of the concentration measured at the curb. Transitory increases of the CO concentration at a distance corresponding to four times the building height was determined. The CO concentrations within building blocks are lowest in contiguous building layout, in which case high CO concentration at the front facing the curb can be substantially reduced by the use of obstacles, such as trees.

38328

APTIC NO. 61487

Stuemke, Hermann

INFLUENCE OF A STEADY TRAILING MOVEMENT ON THE DISPERSION OF STACK GASES ABOVE A PLANE WITH A VALLEY PERPENDICULARLY TO THE WIND FIELD. (Einfluss einer geordneten Nachlaufbewegung auf die Ausbreitung von Schornsteingasen ueber einer Ebene mit quer zum Windfeld eingeschrittenem Tal). Text in German. Staub, Reinhaltung Luft, 34(4):135, April 1974. 1 ref.

To determine the dispersion of stack gases emitted in the center of a valley located perpendicularly to the wind field with a turbulent movement followed by a symmetric stationary flow, a model assuming three layers of different wind velocities is used. Due to the trailing symmetric flow a better dispersion in horizontal as well as vertical wind direction occurs. For a source in the center of a valley, far ahead of a valley, or on the entrance slope to the valley the better dispersion is combined with a reduction of the concentration near the ground. For a source above the valley or on the rear slope, considerably higher concentrations may occur because the off-gas is carried to the bottom of the valley through convection.

38329

APTIC NO. 61236

Vogel, John L.

ANALYSES OF POSSIBLE URBAN-EFFECT THUNDERSTORMS. Preprint, American Meteorological Society, St. Louis, Mo., 4p., 1974. 1 ref. (Presented at the Conference on Weather Forecasting and Analysis, 5th, St. Louis, Mo., March 4-7, 1974.)

A preliminary analysis was made concerning the interaction between city of St. Louis and convective activity on August 10, 1973. The first radar cell was noted over East St. Louis at about 1315 CST. The cell grew to a height of 14 km during its lifetime and remained stationary for some 90 min. The thunderstorm formed within the area of general confluence over the city and was coincident with a maximum of temperature and moisture at the surface. During the early afternoon hours a meso-scale wave moved across the monitoring network, though it was impossible to identify this wave at the 850 mb level on the normal synoptic scale. The flow pattern at 300 m MSL appeared under the influence of the terrain and urban-industrial complex. An area of confluence was observed downwind of the city, despite the fact that the first convective activity formed over East St. Louis, in the general zone of confluence rather than in the maximum area of confluence. The activity did occur over an area of maximum surface temperature and moisture, and preliminary modeling results suggested that the field may have had an important influence on the initial development of the thunderstorm.

1973

38330

APTIC NO. 60453

Abdullah, M. I. and L. G. Royle

THE OCCURRENCE OF LEAD IN NATURAL WATERS. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc. Int. Symp. Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 113-124, May 1973. 21 refs. (Oct. 2-6.)

The distribution of dissolved and particulate lead in the coastal waters of the eastern Irish Sea, and in the rivers flowing into part of this region, is considered. Possible causes of accumulation of Pb in these sea areas are discussed, and the regions of industrial and natural pollution are defined. The analytical procedures used in these surveys are briefly described. The sources of the Pb are weathering of rocks, weathering of Pb mineral deposits, and Pb from human activity in nearby land areas. The human sources include use of tetraethyl Pb as a gasoline additive, industrial waste, and Pb in the air. The fact that much of the industrial contribution comes from the atmosphere is reflected in the fact that the mixed surface layer of the ocean contains 0.2 micrograms Pb/l compared with the deep water content of 0.03 micrograms Pb/l.

38331

APTIC NO. 60981

Ammoual, R.

THE INFLUENCE OF THE EXPOSURE TIME ON AIR POLLUTANT CONCENTRATION MEASUREMENT. (Influence de la duree d'exposition sur les mesures de concentration des polluants atmospheriques). Text in French. Rev. Gen. Thermique (Paris), 12(142):989-996, Oct. 1973. 2 refs.

Larsen's mathematical model and its practical application for the determination of the pollutant concentration distribution for arbitrarily selected exposure durations from the concentration distribution obtained empirically for a given exposure time, e.g., 24 hr, after described. Air pollutant concentration data for a given site and a given exposure time permit characterization of the given site by determining the peak concentrations that may occur during different exposure periods. The control of the pollution level by the determination of the probability at which a given pollutant concentration may be exceeded during a given exposure time compares this probability to a threshold value. The mathematical model also permits prediction of the pollutant concentrations for the given site. The frequency-concentration-exposure time diagrams show the peak concentration for each exposure time, the frequency with which a given concentration is exceeded, and permit the comparison of the measurement data obtained for the given site with standard values.

38332

APTIC NO. 60699

Andreasson, Kenth, Cyril Brosset, and Bengt Steen

INVESTIGATION OF LONG DISTANCE TRANSPORTED AIR-BORNE PARTICULATE MATTER DURING THE DECEMBER EPISODE 1972. Preprint, Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), 21p., March 1973. 11 refs.

Samples of long distance transported particles were collected on the days just before Christmas 1972 at the remote sampling station at Rao, Sweden; particle counting was performed parallel with the sampling. The samples were analyzed with respect to total mass and for total and water-soluble sulfate and iron. Leach solutions of the samples were titrated, and their concentration of acid determined by means of Gran's plot; the leach solution from one sample was analyzed with respect to most relevant ions. A synthetic solution was then prepared on the basis of this analysis, and acid was determined in this solution exactly as it had been determined in the leach solution. The result showed that the particle sample did not contain any measurable amount of free strong acid; its leach solution, however, did contain acid due to the hydrolysis of the iron (III) and aluminum ions. It is thus probably necessary to determine the content of free strong acid as well as water-soluble iron (III) and aluminum for particles in assessing their effect on acidification of lakes and soil. (Author abstract modified)

38333

APTIC NO. 61132

Beilke, S., H.-W. Georgii, and R. Schmitt

SO₂ SINKS IN THE ATMOSPHERE AND IN THE SOIL. (SO₂-Senken in der Atmosphäre und am Erdboden). Text in German. In: Repräsentanz luftchemischer Messungen an Background-Stationen. Kommission zur Erforschung der Luftverunreinigung. Mitteilung VII, p. 81-91, 1973. 10 refs.

The importance of the washout mechanism and of various kinds of soils as sulfur dioxide sinks is discussed. Model experiments in a chamber where a rain shower, a steady precipitation over a long period of time, and a drizzle could be simulated, showed that the decrease of the SO₂ concentration due to washout followed an exponential function under ideal conditions. The magnitude of the washout speed depends on the precipitation intensity, on the size distribution of the rain droplets, and on the temperature of the rain water. With uniform composition of the rain and a constant droplet size distribution, the SO₂ concentration drops more rapidly due to washout, the degree increasingly proportional to the intensity of the rain. The washout speed depends on the chemical composition of the rain water, for which the pH value can be used as the indicator. The SO₂ concentration dropped more rapidly with a higher pH value of the rain water. The drop was further enhanced through the presence of catalytically active compounds. A model calculation of the sulfate increase in the rain water caused by washout and rainout of SO₂ and of aerosol particles containing sulfate, reveals that the measured sulfate quantity in rain is too large extent due to the washout of SO₂ and to a lesser extent to the washout of sulfate particles. The SO₂ concentration near the ground was responsible for the sulfate concentration. The absorption capacity of schist, clay, gravel, soil on which grass grew, water, ice, snow, and loess was determined in a special chamber with rain water SO₂ concentrations of 0.8 and 4 mg SO₂/cu m. The absorption capacity of all substances was higher than 50%, and the absorption properties were better under wet conditions.

38334

APTIC NO. 61139

Bergstrom, R. W.

EXTINCTION AND ABSORPTION COEFFICIENTS OF THE ATMOSPHERIC AEROSOL AS A FUNCTION OF PARTICLE SIZE. Beitr. Physik Atmosphäre, 46(4):223-234, 1973. 17 refs.

The influence of the complex refractive index on the extinction and absorption coefficients of aerosols as a function of particle size is predicted. Increases in the absorption index of the refractive index greatly increase the contribution of small particles (r less than 0.1 micron) but have little effect on large particles (r greater than 5 micron) for wavelength of 0.55 micron. While particles of index of refraction 1.5-0.02i and 1.5-0.05i have relative constant absorption per mass for particles smaller than 1 micron, carbon particles of 0.1 micron radius are an order of magnitude more absorptive than particles of 1.0 micron radius. The effects of a power law size distribution and logarithmic Gaussian distribution are also shown. For example, if a power law extends to particles of 0.01 micron radius then 20% of the absorption at a wavelength of 0.55 micron is contributed by particles 0.01-0.04 micron for a refractive index of 1.5-0.05i. Thus the question of whether the atmosphere contains small absorbing particles or large absorbing particles is important for understanding the observed absorption by atmospheric aerosols.

38335

APTIC NO. 61377

Bouscaren, M.

METHOD FOR CALCULATING STACKS EMITTING SULFUR DIOXIDE AND DUST IN FRANCE. (Méthode de calcul des cheminées émettant SO₂ et poussières en France). Text in French. VDI (Ver. Deut. Ingr.) Ber., no. 200:73-95, 1973.

The modified version of the USSR method for the calculation of stacks emitting sulfur dioxide and dust, as adopted in France, is described. The original equation of the atmospheric turbulent diffusion, relating to favorable atmospheric conditions, was solved by network method numerically by the use of different limit values. Wind was supposed to be a logarithmic function of altitude, and the vertical component of the exchange coefficient was assumed to vary linearly with the altitude. The transversal exchange coefficient was supposed to be proportional to the wind velocity at different altitudes. In the French version, the coefficient describing the meteorologic conditions was chosen at 160 against 120 and 300 adopted for different territories of the USSR, and the rate of discharge was required to exceed 8 m/sec for installations with capacities over 8,000 thermal units/h. For installations emitting dust from several stacks whose distance from each other is not more than two times stack height, the stack height is increased. This new method is now applicable to installations emitting SO₂ and respirable dust, cement works, waste incinerator plants, ore dressing plants, foundries, steel works, gypsum burning plants, and asphalt plants.

38336

APTIC NO. 60955

Brosset, Cyrill

DANGER OF WATER POLLUTION THROUGH AIR.

Preprint, Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), 29p., July 1973. 10 refs.

Acid contamination of water recipients by airborne substances such as sulfur dioxide is reviewed. Deposition appears to be divided into a near and a remote zone, resulting from the source emission of sulfur compounds partly in a form which allows immediate washout and partly in a form which is washed out after a period of time. Sulfur dioxide is dissolved in the usual manner in clean water, and its concentration in the solution becomes dependent on its partial pressure in the ambient air; this case is commonly referred to as reversible solubility. The presence of catalytically active substances in a raindrop favors oxidation of the dissolved SO₂ to sulfate, with the dissociation of two protons; and this case of irreversible solubility allows for much more SO₂ to be taken up in the drop. The process ceases because of the increased acidity of the drop. Contact between SO₂ molecules in the gas phase and suspended particles carrying catalysts is likely, in the presence of humidity, to lead to oxidation of SO₂ on the surface of the particles to sulfuric acid which to some extent may dissolve the particles; this may be one of the mechanisms for introducing catalytic substances into the precipitation drops. Direct reaction between SO₂, ammonia, and water is also possible. Air mass trajectories leading to particle episodes, fallout patterns of sulfate, titration curves for precipitation and particle samples, frequency distributions of data point values, and particle concentrations are given for various particle investigations conducted in Sweden.

38337

APTIC NO. 60614

Crutzen, Paul

A DISCUSSION OF THE CHEMISTRY OF SOME MINOR CONSTITUENTS IN THE STRATOSPHERE AND TROPOSPHERE. Stockholm Univ., Stockholm (Sweden), Inst. of Meteorology and International Meteorological Inst., Stockholm (Sweden), Rept. AP-12, 27p., March 1973. 62 refs. (Presented at the Symposium on Atmospheric Ozone and General Circulation in the Stratosphere at Arosa/Switzerland, Aug. 21-25, 1972.)

NTIS: N73-30357

Atmospheric reactions of the water-methane-oxygen-ozone-nitrogen oxides system in the stratosphere and troposphere are examined. Such reactions may lead to significant production of ozone in the lower troposphere, and their role in the odd hydrogen balance is considered. Methanol may be an intermediate in the oxidation cycle of methane, especially in the cold stratosphere; and its photodissociation into hydrogen and

formaldehyde may consequently provide an important source for stratospheric hydrogen. Catalytic photochemical chains of reactions involving oxides of nitrogen and oxides of hydrogen may also lead to tropospheric destruction of ozone. Model calculations indicate that stratospheric ozone is most sensitive to changes in the adopted lower boundary values of nitrous oxide and that an increase in water vapor concentrations in the lower stratosphere will cause some increase in ozone as predicted. Fluctuations in the solar radiation flux near 190 nm may also cause significant variations in stratospheric ozone. (Author abstract modified)

38338

APTIC NO. 60626

Facy, L., J. Pauly, and M. Perrier

PROBLEMS OF LONG-DISTANCE TRANSPORT AND DIFFUSION. (Problemes de transport et de diffusion a grande distance). Text in French. Etablissement d'Etudes et de Recherches Meteorologiques, Paris (France), APCA Rept. 73-137, 27p., June 1973.

Studies and observations on long-distance transport of air pollutants on small, medium, and intercontinental scales are described. The theoretical determination of pollution concentrations at a given distance from single and multiple sources is possible only if ideal orographic, meteorologic, and turbulence conditions are assumed. Air pollutant transport processes for distances exceeding 10 km cannot be simulated by classical models of turbulent diffusion, but hydraulic models are highly valuable. Forecasts on this scale require a combination of meteorological observations and actual pollutant monitoring. High pollutant concentrations may occur large distances from the emission source during inversion periods, especially when the inversion layer is higher than the altitude of the emission source. Transport of specific pollutants over distances up to 100 km was observed in France on several occasions coinciding with specific meteorological conditions. The intercontinental transport of air pollutants is best exemplified by repeated observations of dust from the Sahara in different parts of Europe and even in South America.

38339

APTIC NO. 61128

Fortak, H.

THE APPLICATION OF THE DISPERSION CALCULATION - A CRITICAL SURVEY. (Die Anwendung der Ausbreitungsrechnung - ein kritischer Ueberblick). Text in German. In: Repraesentanz luftchemischer Messungen an Background-Stationen. Kommission zur Erforschung der Luftverunreinigung, Mitteilung VII, p. 26-39, 1973. 7 refs.

The application of the dispersion calculation for point and area sources is reviewed. The first useful dispersion calculation of waste gases from a single source stems from O.G. Sutton. His formula is based on a ground level and stationary meteorological dispersion parameters. An expansion of the formula to take temperature inversions into account is given. Thy expanded formula contains the theta-function by Jacobi. A block diagram is presented describing the tasks and accomplishments of a dispersion model for many individual sources. It comprises the input side (emission inventory of the investigated area), the actual system (i.e., the atmospheric condition under which transport and turbulent diffusion takes place), and the output of simulated concentration series. The dispersion calculation has not yet been developed far enough to permit determination of optimum economical changes on the emission side so that the emissions do not exceed certain limits within a particular future period. More promising is the solution of problems concerning the simulation of air pollution climatology. A climatological dispersion model applicable for the conditions of the city of Bremen is described. Based on an emission inventory consisting of 136 individual sources and area sources (domestic heaters), the concentration fields close to the ground were calculated for a large number of weather conditions and stored as an emission inventory. With the aid of the emission inventory and the statistics of weather conditions for a certain

period of time, the frequency distribution of concentrations on all grid points spaced 500 m apart can be calculated. The characteristic parameters of each grid point are used for cartographic illustrations.

38340

APTIC NO. 61427

Fujii, T. and K. Imamura

STUDIES ON THE AIR POLLUTION BY PHOTOCHEMICAL REACTION (3). (Kokagaku hanno ni yoru taiki osen ni kansuru kenkyu (3)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):577, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 300.)

A sulfur hexafluoride diffusion experiment was conducted to study the effects of meteorological conditions on the ozone concentration in the Osaka Bay area. The SF₆ was diffused from a fixed source and from a vehicle moving at 30 km/hr between two points separated by 2.5 km. The highest SF₆ concentration was detected at an altitude of 300 m when they were diffused from a fixed source and at 200 m when from a moving source. A higher ozone concentration was found in the afternoon. At 8 am, the land wind was particularly important in affecting the atmospheric flow in the zone of less than 500 m; however, this was not so in the afternoon.

38341

APTIC NO. 58398

Fukuhara, Kenji

RELATIONS BETWEEN SURFACE DIVERGENCE PATTERNS ACCOMPANIED WITH LAND AND SEA BREEZE CIRCULATION AND ATMOSPHERIC POLLUTION LEVELS. (Kairikufu ni tomonau hassan bunpu to taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):398, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 137.)

Using the data of air pollution monitoring stations in Osaka and data on wind velocity and directions in the Osaka area, weather maps of 2 km mesh showing the east-west and north-south elements of wind and pollutants were prepared. Average sea breeze occurrences and average oxidant concentration distributions, land breeze averages and average oxidant concentrations, sea breeze fronts and oxidant patterns, sea breeze fronts and pollutant dispersion, and the time changes of wind velocities and oxidant levels, are presented by maps.

38342

APTIC NO. 61373

Hess, W. and A. Haerter

METEOROLOGICALLY SUBSTANTIATED PROPOSAL FOR A METHOD FOR THE CALCULATION OF MOTOR VEHICLE-GENERATED CARBON MONOXIDE EMISSIONS IN STREETS WITH HIGH TRAFFIC DENSITY. (Messtechnisch begruendeter Modellvorschlag zur Berechnung der Ausbreitung von CO-Abgasen aus Kraftfahrzeugen an verkehrreichen Strassen). VDI (Ver. Deut. Ingr.) Ber., no. 200:109-121, 1973. 5 refs.

Systematic carbon monoxide concentration and wind speed measurements were made at six sampling sites at distances of 4, 12, 20, 29, and 40 m off the curb and directly at the curb perpendicular to a busy five-lane street in Zurich for the establishment of correlation between CO concentrations and wind speed. The CO measurements were performed with a URAS 1 type instrument, and a new control device that can be switched to a CO measuring apparatus for CO dispersion studies along heavily traveled roads. From 48,000 single measurements, 9600 half-hour averages were calculated, and the CO concentrations were plotted as a function of wind direction and distance from the roadway. These results served as the basis for the formation of a new mathematical formula for estimating the CO concentrations as a function of traffic density and wind velocity. The half-hour CO concentration is cal-

culated as a function of the hourly traffic density. Good agreement between the values calculated with Sutton's formula and the new formula, and the actual measurements was established.

38343

APTIC NO. 60664

Hewson, E. Wendell, Gerald C. Gill, and Gerald J. Walke
SMOKE PLUME PHOTOGRAPHY STUDY. BIG ROCK POINT NUCLEAR PLANT, CHARLEVOIX, MICHIGAN. Michigan Univ., Ann Arbor, Dept. of Meteorology and Oceanography, Rept. 3, 04015-3P, 91p., Dec. 1973. 10 refs.

Atmospheric diffusion experiments using a smoke plume released from the meteorological tower and from the plant stack as a visible tracer are reported for the Big Rock Point Nuclear Plant in Charlevoix, Michigan. Numerical data obtained from the diffusion study include: temperature difference between different height levels on the tower; the average wind speed and direction at 256 ft tower elevation at the time that photographs were taken; wind differences at two different tower elevations; the one-half hour averaged plume dimensions from which Sutton diffusion coefficients were calculated; familiar Sutton diffusion coefficients calculated for the same period using different data and various techniques; and a dispersion factor indicating the maximum amount of diffusion occurring on the visible plume center line. Photographic data of typical visible plume contours for stable, near neutral, and unstable lapse conditions are also presented.

38344

APTIC NO. 60825

Hilt, Glenn R., Coleman duP. Donaldson, Milton Teske, Ross Contiliano, and Johnny Freiberg

A COUPLED TWO-DIMENSIONAL DIFFUSION AND CHEMISTRY MODEL FOR TURBULENT AND INHOMOGENEOUSLY MIXED REACTION SYSTEMS. (FINAL REPORT). Aeronautical Research Associates of Princeton, Inc., Princeton, N. J., Environmental Protection Agency Contract 68-02-0014, Program Element A-11099, EPA-R4-73-016c, ARAP Rept. 186, Vol. III, 93p., March 1973. 11 refs.

The fundamental chemical kinetic equations for an inhomogeneously mixed binary reaction system are derived exactly and solved for various initial conditions in order to assess the effects of inhomogeneous mixing on chemical reaction rates. These effects are shown to be highly significant in several atmospheric chemistry situations, particularly when the reactants emanate from multiple sources. An approximate second order closure of the chemical submodel is then developed and coupled with the second order (invariant) turbulent diffusion model. Initial calculations of the interaction of turbulent diffusion and chemical reactions are presented, including a simulation of a multiple freeway situation. Conditions under which chemical reactions are diffusion and mixedness limited are illustrated. (Author abstract)

38345

APTIC NO. 61568

Hino, Mikio

STATISTICAL PREDICTION METHOD OF ENVIRONMENTAL POLLUTION COMBINING CONTROL THEORY AND MULTI-VARIATE ANALYSIS. (Seigyron to taehenryo kaiseki o kumiawaseta kankyo osen no tokeiteki yosokuho). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 32-36, 1973. 13 refs. (Presented at the Japan Society of Civil Engineers, Environmental Problems Symposium, 1st, Tokyo, Japan, Dec. 3-4, 1973.)

A physical approach such as expression by differential equations of environmental pollution phenomena is not enough to explain such physical phenomena as turbulent diffusion which affect air pollution. This is because they are of a nonlinear nature involving an extremely large scale and freedom of varia-

tion. There are therefore several air pollution prediction methods which can be roughly classified to physical and nonphysical models, the former comprising the physical model, the simplified physical model, and the simplified physical model/control theory, and the latter including the control theory and the statistical method. Whereas a physical method finds simplified universal laws governing interrelations among several factors and then clarifies more complex relations among various given factors by means of the universal laws, it is a more common practice in the field of psychological or medical studies to try to find such universal laws through an objective processing of the experimental data. The latter is known as the multi-variate analysis consisting of regression analysis and factor analysis. Although the regression analysis combined with the factor analysis may be capable of producing an accurate prediction of the long periodical fluctuation of air pollution, it is still subject to prediction errors due to nonlinear relations between irregular variates and to a number of short-period variable components. To solve this problem, the adapted control theory has been incorporated in the new prediction method called stochastic prediction through kalman filtering combined with regression and factor analyses. An example of the computerized simulation designed to test validity of the method is shown.

38346

APTIC NO. 61547

Horikawa, Genichi

SIMPLE CALCULATION GRAPH ON DIFFUSION OF SULFUR OXIDE FROM AIR POLLUTION CONTROL STANDPOINT - MIDDLE AND CLASS BOILERS. (Taikiosen boshiho ni yoru iwosankabutsu no kakusan hayami zuhyo - Chusho boira ni suite). Text in Japanese. Akita Daigaku Kyoika Gakubu Kenkyu Kiyo Shizen Kagaku (Mem. Fac. Educ. Akita Univ. Nat. Sci.), no. 23:132-150, Feb. 1973. 5 refs.

Monographs for easier calculations of effective stack height depending on heavy oil consumption volume and the leeward distance for the maximum ground level concentration of pollutants are presented. Since the Sutton formula of diffusion has been adopted in the Air Pollution Control Law of Japan as the standard formula for calculation of required effective height of a stack, the said formula is described. The K value to be used in the calculation is given in the table of sulfur oxide emission standards set forth in the Law for each local district. Using some representative K values legally set, several monographs designed to obtain immediately any required effective height of a stack for a given volume of heavy oil consumption are developed. Similar monographs to obtain the leeward distance for the maximum ground-level concentration in relation to a given effective height of a stack are also shown. The theory on which the calculations are based is discussed.

38347

APTIC NO. 61378

Hosemann, J. P., S. Jordan, and W. Schikarski

SIMPLE AIR POLLUTION LOAD MODELS FOR POLLUTION PROGNOSIS. (Einfache Luftbelastungsmodelle zur Immissionsprognose). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 200:217-220, 1973. 5 refs.

A simple cell model and a simple diffusion model for the forecasting of air pollution loads are described. The simple cell model, assuming a pollutant budget determined by pollutant generation and pollutant decay, gives the relative air pollutant load as a function of a maximum allowable concentration. This model permits forecasting inside the given cell only, and furnishes stationary or quasistationary long-term averages. The diffusion cell model, based on Fick's diffusion theory, is suitable for pollution forecasts in areas for which no accurate meteorological data and emission surveys are available, since it requires a small number of input data, such as the medium concentration inside the primary cell, stability parameters, and the wind velocity.

38348

APTIC NO. 61544

Ikeda, Arimitsu and Masakatsu Hiraoka

ON METEOROLOGICAL POTENTIALS CONCERNING URBAN AIR POLLUTION. (Toshi taikiosen ni kansuru kisho potensharu ni tsuite). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 27-31, 1973. 8 refs. (Presented at the Environmental Problems Symposium, 1st, Tokyo, Japan, Dec. 3-4, 1973.)

The atmospheric purification capacity in Osaka, Japan, was quantitatively determined by using the data showing the time changes of pollutants emission intensities and the actually measured values of air pollution concentration. At the same time, the pollution concentration was estimated and reviewed in relation to quantitative control of emissions. Meteorological elements were classified into two types, one where the time changes of the atmospheric pressure distribution were known and the other where hourly wind direction, wind velocity, solar radiation and quantity of cloud were known. The basic model designed to assess diffusion purification capacity of air pollutants of an urban scale pollution was first developed from the air pollution data and meteorological conditions. Taking into consideration such factors as the atmospheric ventilation frequency, the average emission intensity per unit area, the volume of polluted air layers, the constant for extinction speed of air pollutants resulting from rainfalls, and the air pollution concentration coming in from outside of the urban area, formulas were developed to come up with the air pollution purification index, a new parameter quantitatively indicating the purification capacity. Meteorological conditions represented by atmospheric pressure distribution were classified into 13 categories, and this parameter was calculated for each category. Using this parameter together with the meteorological element, daily air pollution concentrations were predicted and compared with the observed values. The standard deviation between the two was 0.29.

38349

APTIC NO. 61130

Jessel, U.

GEOGRAPHICAL DISTANCE DISTORTION IN THE POLAR COORDINATE SYSTEM FOR ILLUSTRATING EQUIVALENT IMMISSION EFFECTS OF AREA SOURCES OF NON-UNIFORM DISTANCE AND EXPANSION. (Geographische Distanzverzerrung im Polarkoordinatensystem zur Darstellung äquivalenter Immissionswirkungen von Flächenemittenten ungleicher Distanz und Ausdehnung). Text in German. In: Repräsentanz luftchemischer Messungen an Background-Stationen. Kommission zur Erforschung der Luftverunreinigung, Mitteilung VII, p. 51-54, 1973.

Based on the finding that the higher SO₂ concentrations measured at the Westerland station, influenced by southeast winds, came from such distant emission sources as Hamburg, a graphical illustration of the emission effects of remote area sources was attempted. A map was drawn with Westerland in the center. All emission sources in a radial distance of 800 m were plotted in the polar coordinate system. Summing up the radial black areas sector by sector yields a wind rose distribution which largely corresponds to the measured SO₂ concentrations.

38350

APTIC NO. 61355

Kasahar, Mikio and Kanji Takahashi

ULTRAVIOLET IRRADIATION OF PHOTOCHEMICAL REACTION OF AIR POLLUTANTS. (Taiki osen ni okeru kokagaku hanna to shigaisen shosha). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(4):645-653, Dec. 1973. 29 refs.

The effects of ultraviolet (UV) irradiation on the photochemical reaction rate of air pollutants reacting to sunlight and artificial light were evaluated. The quantity of solar radiation received in the lower atmosphere is dependent on the air

mass, m , and the amount of ozone, dust, D , and precipitable water vapor, W , in the atmosphere. Direct and scattering UV intensity per unit horizontal cross section in the lower atmosphere was calculated theoretically and measured by UV-Meter for various values of the abovementioned factors. Direct UV intensity measured coincided with the theoretical values. As for scattering, observed values have the same qualitative tendencies as the calculated values, but the measured value is 1.5 time as large as that calculated. Specific absorption rate constants depend not only on the amount of radiation received, but on the substance in question, because it depends on the absorption coefficient of the substance. The specific absorption rate constant (k_a) of solar radiation by sulfur dioxide was calculated for the various values of m , O_3 , D , and W . The spectrum of k_a SO₂ has a peak at about 3100 Å and the wavelength at peak shifted to longer values as the values of m , O_3 , D , or W increased. The values are most remarkably influenced by O_3 (except for m).

38351

APTIC NO. 61129

Klug, W.

THE DISPERSION IN THE MESO SCALE RANGE - A SYNOPSIS OF URBAN AIR POLLUTION MODELS. (Die Ausbreitung im Meso Scale-Bereich - eine Synopsis der Urban Air Pollution-Modelle). Text in German. In: Repräsentanz luftchemischer messungen an backgroundstationen. Kommission zur Erforschung der Luftverunreinigung. Mitteilung VII, p. 40-50, 1973. 8 refs.

A mathematical meteorological model for the calculation of concentrations of air pollutants from many sources must contain an emission inventory, meteorological data, a meteorological dispersion model and actual air quality measurements. Models by Lucas, Pooler, Turner, Fortak, Miller and Holzworth, Clarke and Koogler et al. and the St. Louis model are discussed in relation to purpose, source inventory and its integration into the model, dispersion equation, comparison with measured concentrations, and success of the model. For example, the Clarke model calculates nitrogen oxides and sulfur dioxide concentration average with a simplified source inventory over a period of 24 hr for Cincinnati, Ohio. The emission from domestic heaters is assumed to be proportional to the temperature difference between the daily average temperature and 65 F. The industrial emission is estimated with the aid of a catalogue of sources and assumed to be constant. Emissions by automobiles is calculated from the annual gasoline sales. The effective source height for domestic heaters is assumed to be 30 m, the oxides of nitrogen are assumed to be emitted 20 m above ground. A normal vertical distribution of the concentration and a uniform horizontal distribution over a sector of 22.5 deg is assumed. From measured 2-hour concentrations, diurnal averages for SO₂ and NO_x are calculated and compared with the model results. For the oxides of nitrogen a correlation coefficient between calculated and measured values of 0.67 was obtained. For SO₂, the model yielded too high concentrations.

38352

APTIC NO. 61379

Koike, S. and M. Inoue

ON THE SUSPENDED PARTICULATES CONCENTRATION. NO. 3. - VISIBILITY AND COMPONENTS. (Uyu funjin no sokutei kekka ni tsuite (Dai-san-po). - Shitei to seibun no kankei-). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):517, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 247.)

The relations between visibility and the concentrations of particulates, ammonium ion and nitrate ion in Wakayama city were studied. The average visibility in the summer of 1971 was 11.4 km and that in the winter was 15.0 km. The particulates and ammonium ion concentrations were higher in winter than in summer while the nitrate ion concentration was higher in

summer than in winter. The water-soluble components such as ions were tended to be distributed in small particles. Good relationships were found between the visibility and the concentrations of sulfate, nitrate and ammonium ions in summer, and between the visibility and the relative humidity, in addition to the three ions concentrations, in winter. The visibility in summer was affected mostly by sulfate and nitrate ions.

38353

APTIC NO. 60832

Lui, Mei-Kao and P. M. Roth

URBAN AIR SHED PHOTOCHEMICAL SIMULATION MODEL STUDY. VOLUME I - DEVELOPMENT AND EVALUATION. APPENDIX C - MICROSCALE MODEL OF LOCAL VEHICULAR SOURCE CONTRIBUTIONS TO MEASURED POLLUTANT CONCENTRATIONS. Systems Applications, Inc., Beverly Hills, Calif., Environmental Protection Agency Contract 68-02-0339, Program Element 1A1009, EPA-R4-73-030d, 46p., July 1973. 12 refs.

A microscale model of local vehicular source contributions (carbon monoxide emissions) to measured pollutant concentrations in the Los Angeles County Area has been developed to provide a realistic basis for validating the urban scale model. Two flow regimes, the free flow regime and the street canyon, were identified in describing transport and dispersion phenomena in the vicinity of a street, and a model was developed for the free flow case using the following assumptions: steady state; transport restricted to two dimensions; averaged, instead of instantaneous, concentrations and velocities; K-theory; a line source; constant horizontal wind speed and direction; constant vertical diffusivity, invariant with height at a given time; and vertical diffusivity equal to horizontal diffusivity. Graphs were developed displaying the relationship between the magnitude of concentration elevation and the distance of the sampling probe from the street, the speed and direction of the local wind, and the magnitude of the local turbulent eddy diffusivity. The model was applied in the prediction of hourly carbon monoxide concentrations at four monitoring stations for 6 validation days, and comparisons were made between measured concentrations and the sum of predicted concentrations calculated using both the microscale model and the full airshed model. The results appeared quite promising, pending a more complete data base.

38354

APTIC NO. 60643

Mangarella, Peter A. and Richard R. Knapp

DYNAMICS OF CONDENSED COOLING TOWER PLUMES. Preprint, American Geophysical Union, 50p., 1973. 14 refs. (Presented at the American Geophysical Union, Fall Annual Meeting, San Francisco, Calif., Dec. 10-14, 1973.)

A numerical solution to the integral conservation equations governing plume dynamics was used to describe the characteristics of wet plumes which might be created by a forced draft cooling tower. Two zones of flow, the zone of flow establishment encompassing the core region and the zone of established flow (in which a Gaussian profile description is used), were recognized. Special attention was given to the effect of the condensation process on liquid mass fraction, temperature, and trajectory. Parametric studies included varying the wind speed and atmospheric stability. (Author abstract)

38355

APTIC NO. 60850

Naden, Rex A., J. Venn Leeds, Jr., and Paul E. Pfeiffer

USE OF THE RECIPROCITY THEOREM AND MAPPING THEOREMS IN LOCATING AIR POLLUTION SOURCES. IEEE Inst. Elec. Electron. Engrs. Trans. Syst. Man Cybern., smc-3(2):147-154, March 1973. 16 refs.

Several analytic tools for the remote surveillance of air pollution sources have been presented. The most useful result is the source-receptor reciprocity theorem, which is a method of using one or more ground level air pollution transducers to de-

tect anomalous emissions from a fixed point source. The theorem must be applied with care if it is required that diffusion patterns do not change character in the region of interest. The key to using the theory of this paper is partial source characterization. It is assumed that a source can be identified with five variables, including the two position variables and three operating parameters. Uncertainty in any of the variables can be reduced by partial or complete knowledge of the other variables, depending on diffusion models and surveillance data accuracies. The case in which the source position is unknown but operating parameters are partially characterized has been considered in detail. The sensitivity of the areal resolution of an arbitrary system of transducers at different locations has been examined with respect to uncertainties in operating parameters. The areal resolution varies continuously and monotonically with variation of the source uncertainty bands. An example illustrating one application of the present theory has been given. Axial symmetry of diffusion patterns (due to a long averaging time) was assumed. Dependence of the system performance on model and transducer accuracy was demonstrated. (Author conclusions modified)

38356

APTIC NO. 61385

Nakamura, K., I. Kojima, S. Shibata, and K. Koike

SULFUR OXIDES CONCENTRATION DATA AT NAGOYA OBSERVATORY AMONG THE NATIONAL OBSERVATION NETWORK, DURING 1971. (Kokusetsu taiki sokuteimou Nagoya sokuteikyoku ni okeru showa 46 nendo iou sankabutsu oudo sokutei kekka ni tsuite). Text in Japanese. Aichi-Kogai Chosa Senta Shoho (Rept. Environ. Pollut. Res. Cent., Aichi Pref.), no. 1:14-22, March 1973. 3 refs.

The relationship between the sulfur dioxide concentration and meteorological variables in Nagoya was investigated. The annual average of the monthly mean 1-hour concentration of SO_x was 0.031 ppm and the maximum was 0.17 ppm. Concentrations of SO_x were below the standard at almost all times. A south-southwest wind gives a mean 1-hour SO_x concentration of 0.050 ppm and a southwest wind gives a concentration of 0.053 ppm. Winds from other directions give concentrations ranging from 0.025-0.039 ppm. South, south-southwest, and southwest winds tend to give higher concentrations in summer, and northwest and west-northwest winds give higher concentrations in winter. Wind velocities below 0.2 m/sec give concentrations of 0.035 ppm, and the concentration decreases as the velocity increases. During holiday periods when factories are shut down SO_x concentrations decrease.

38357

APTIC NO. 61374

Narita, O.

CONSIDERATIONS ON THE RELATION BETWEEN AIR POLLUTION AND SURFACE WIND IN URBAN AREA. (Shikai chiiki no taiki osen no kikogakuteki kaiseki. (Sapporo shi no kaze no kaiseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):393. Oct. 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 132.)

The location characteristics of the wind and sulfur oxides concentration in Sapporo City were analyzed with data on wind direction, wind velocity and SO₂ one hour values furnished by one meteorological station and six pollution control centers. The maximum wind velocity was found in the surrounding area at altitudes of up to 100 m and the wind velocity (of horizontal direction) decreased in the city area. As expected, the atmosphere of the lower layer in the city area in a horizontal direction was found to be convergent. There was an intimate relationship between the wind velocity and SO₂ concentration at the time zone where the change of total emission was low. However, the daily average concentration was not noticeably affected by the periodical change of wind conditions including wind velocity. There was also no clear relation

between the two at areas closed to the emission sources, but the relationship became more significant as the area became more distant from the sources.

38358

APTIC NO. 61353

Ogawa, Yasushi

EFFECTS OF BUILDING ON DIFFUSION. PHASE 2. MULTIPLE BUILDINGS. (Tatemono no kakusan ni oyobosu eikyo sono 2: renzoku shita takemono). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(4):661-671, Dec. 1973. 8 refs.

The dispersion of pollutant gas from the ground level source located between buildings was investigated. The results of an extended investigation of carbon monoxide concentration profiles in Frankfurt/Main by Georgii et al (1967) showed that the higher CO concentration was observed at the leeward building surface than that of the windward surface and revealed changes in concentration profile with changes in roof top wind velocity. Two dimensional wind tunnel studies of flow and concentration fields in street canyons were carried out at Hokkaido University and New York University. A numerical study shows that in the cavity between buildings, the pollutant was originating at the ground is carried upwind by a large vortex. This causes higher concentration at leeward building surface than at windward surface. At higher roof top wind velocity, the transport of gas is mainly carried out by vortex motion, while at lower wind velocity, transport by diffusion becomes dominant.

38359

APTIC NO. 61354

Ogawa, Yasushi

EFFECTS OF BUILDING ON DIFFUSION. PHASE 1. SINGLE BUILDING. (Tatemono no kakusan ni oyobosu eikyo, sono 1: koritsu shita tatemono). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 3(4):654-660, Dec. 1973. 9 refs.

The diffusion phenomenon near single buildings was investigated with emphasis on the down draft and the remaining gas in the cavity behind the building. The following three methods in the two dimensional case were used: wind tunnel and water channel experiments, small scale field experiment, and numerical study. The measurements and calculations of flow and diffusion field were made. The turbulent Reynolds number including the effect of air stability were chosen for the similarity criterion. The value is 40 to 60 in the wind tunnel experiment and about 60 in the small scale field experiment. The numerical study of flow field behind the building was made using the momentum equations in turbulent conditions and using the equation of continuity. The length of cavity behind the building increases linearly with increases in the Reynolds number. The concentration dispersion from the line source above the building was calculated and is in good agreement with the wind tunnel experiment.

38360

APTIC NO. 58447

Okumoto, Masoyoshi, Tetsuya Katayama, Keiko Yamada, Takeo Hashimoto, and Hiromi Yoshida

A STUDY ON THE RELATIONSHIP BETWEEN OZONE CONCENTRATION AND PARTICULATE MATTER IN AIR. (Fuyu funjinryo to ozone nodo to no gyaku sokan ni suite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):442, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 176.)

Contrary to the previous reports made on the plus correlation between suspended particulates and ozone concentration, the records of monitoring in Kawasaki frequently show minus correlations between those pollutants. Data analysis was made on the records of weather bureau and air pollution monitoring between January and March 1973. The ozone concentration fluctuation patterns agree well with the fluctuation patterns of

the sunshine; but there was some time lag and a reverse correlation between suspended particulates and ozone. The data on suspended particulates and ozone concentration in general showed a minus correlation with less than 1% danger rate.

38361

APTIC NO. 58904

Overcamp, Thomas J. and James A. Fay

DISPERSION AND SUBSIDENCE OF THE EXHAUST OF A SUPERSONIC TRANSPORT IN THE STRATOSPHERE. J. Aircraft, 10(12):720-728, Dec. 1973. 30 refs. (Presented at the ALAA 5th Fluid and Plasma Dynamics Conference, Boston, Mass., June 26-28, 1973, Paper 72-650.)

A theoretical model is presented that describes the early time history of the wake of an aircraft. Buoyancy dominates the growth of the wake far downstream of the aircraft; and for a supersonic transport flying in the stratosphere, the stable stratification will limit the growth of the wake. Data of the visible width of the wake from laboratory experiments in a towing tank and from studies on the growth of contrails from subsonic aircraft verify the model for a neutral atmosphere. The model of wake subsidence for the case of no atmospheric dispersion shows that the exhaust gases will sink from the differential cooling of the gases due to the depletion of ozone from the oxides of nitrogen in the wake and the high concentration of water vapor. Dispersion by atmospheric turbulence will slow and eventually stop this sinking. Estimates show that if the turbulence is weak, the subsidence can continue for days to weeks; for stronger turbulence, the dispersion will prevent the process entirely. Estimates of the rate of subsidence are given for aircraft flying between 16 and 27 km. (Author abstract modified)

38362

APTIC NO. 58392

Oya, Fumihiko, Kiyonobu Seki, Shogo Ochiai, Takashi Mukaida, and Nobuaki Kadoya

PHOTOCHEMICAL AIR POLLUTION IN KANAGAWA (NO. 5), METEOROLOGICAL FACTOR OF PHOTOCHEMICAL AIR POLLUTION. (Kanagawa-ken ni okeru kokagaku kogai ni suite (dai-5-ho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):580, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 303.)

The meteorological conditions for the 1972 photochemical smog occurrences in Kanagawa were as follows: the weather was usually sunny or cloudy, with the maximum temperature above 25 C, visibility less than 10 km at am and less than 4 km at 3 pm, wind direction N-E at 9 am and E-SW in the afternoon, wind velocity less than 3 m/sec. Strong pollution appeared when MMD was less than 1000 m. Air pressure patterns were often south high, north low, or mobile high pressure in south. When streams appeared in south wind, pollution occurred in the inland. Oxidant concentration frequently rose even when nitrogen oxide concentration was low. The oxidant level was usually high during the day, but areas close to traffic arteries saw high oxidant concentrations sometimes late at night. Nitrogen dioxide concentrations showed the same tendency as oxidants and rose during the day, but the nitric oxide concentration pattern was reversed and peaks appeared at night.

38363

APTIC NO. 61110

Phan Cong, L. and J. Dessens

ARTIFICIAL FOGS GENERATED BY INDUSTRIAL WATER VAPOR EMISSIONS. (Brouillards artificiels produits par emission industrielle de vapeur d'eau). Text in French. J. Rech. Atmospheriques, 8(2):109-116, April-June 1973. 4 refs.

The continuous exhaust of water vapor into the atmosphere at a rate of 65 tons/hr from a pulp mill in Saint-Gaudens, France,

produces very dense layers of fog under specific meteorological conditions. The pulp mill is located in a valley with low wind frequency and high frequency of low inversions. Nocturnal emissions at heights of 35-45 m cause vapor saturation in the low stable layer which then extends gradually to cover tens of square kilometers by morning. The fog is stabilized by solar radiation heating the upper boundary. Slow dispersion is also due to high water content and especially to the small size of the fog droplets. Dispersion could be accelerated by shifting the droplet size spectrum to larger droplet sizes with water content unchanged.

38364

APTIC NO. 60844

Reynolds, S. D., Mei-Kao Lui, T. A. Hecht, P. M. Roth, and J. H. Seinfeld

URBAN AIR SHED PHOTOCHEMICAL SIMULATION MODEL STUDY. VOLUME I - DEVELOPMENT AND EVALUATION. Systems Applications, Inc., Beverly Hills, Calif., Environmental Protection Agency Contract 68-02-0339, Program Element 1A1009, EPA-R4-73-030a, 148p., July 1973. 32 refs.

An urban air shed simulation model for estimating ground level concentrations of photochemical pollutants has been developed and evaluated. Study areas of concern were: limited model development and improvement as part of a continuation of an earlier development study; extensive evaluation of the photochemical kinetics mechanisms, involving 14 experimental studies and four hydrocarbon systems; and extensive evaluation of the urban airshed model for the Los Angeles Basin during a 6-day period of high pollution levels. Pollutants considered were: carbon monoxide, nitric oxide, nitrogen dioxide, hydrocarbons, and ozone. Carbon monoxide and NO predictions agreed fairly well with the measurements except for times and locations of sharp peaks during the morning rush hours. The general pattern of NO₂ prediction showed bias for profiles after the midmorning peak and was consistent with the absence of sinks in the model. Predicted behavior was quite similar to observed behavior for NO-O₃ phasing, in contrast to the disappointing performance of the model with regard to NO₂-O₃ phasing. Comparison between prediction and experiment for HC was generally quite favorable.

38365

APTIC NO. 59292

Scorer, R. S.

CONFERENCE REPORT. Atmos. Environ., 7(12):1155-1162, 1973. (Presented at the Atmosphere and Man Conference, Imperial College, London, England, Jan. 3-5, 1973.)

Papers presented at a conference on the atmosphere and man are commented upon. Among the topics included are atmospheric gases; the increase of nitrous oxide in the atmosphere; atmospheric photochemical reactions; the effects of aerosols on sunshine; the unreliability of the standard 24 hour smoke and sulfur dioxide instrument; trends in carbon dioxide concentration; costing the effects of air pollution; the British method of controlling domestic smoke; fuel economy; and overpopulation.

38366

APTIC NO. 60456

Servant, J.

TRANSPORT OF LEAD IN THE ENVIRONMENT. (Transport du plomb dans l'environnement). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 155-165, May 1973. 10 refs. (Oct. 2-6.)

In France, during the last few years, the lead concentration was measured in air, water, rain, and trees. From Nov. 1971 to June 1972, the mean concentration of Pb in rain was equal to 14.5 g/l; the fallout over France was 0.66 times 10 to the 9th power g/mo. In the Midi-Pyrenees region, the natural origin of

AIR POLLUTION ABSTRACTS, AUGUST 1974

Pb in river water was studied. From March 1971 to June 1972, the mean soluble concentration varied from 6.7 to 10.4 times 10 to the -6th power g/l. The balance of gains and losses of Pb per unit of surface of the earth is discussed.

38367

APTIC NO. 61260

Shinra, Koichiro

CALCULATIONS ON THE DIFFUSION OF DUST PARTICLES IN ATMOSPHERE. (Taiki-chu no funjin ni tsuite no kakusan keisan). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 2(11):842-843, Nov. 1973.

The relation between the particle diameter of dust and the rate of precipitation, the dust concentration in the atmosphere the relation between the suspended particulates and the amount of dust fall, a comparison between theoretical and experimental values, the discharge coefficient of dust and sulfur oxides, and the diffusion of dust particles in a calm atmosphere were discussed. When the density of dust particles is 3, the rate of precipitation is 0.05 m/sec for particles of 30 micron in diameter and 0.020 m/sec for those 4 micron in diameter. The ratio between the amount of dust fall and the concentration of suspended particulates was about 0.018, this ratio giving an approximate value of the rate of precipitation. This ratio is decreasing recently and this decrease is attributable to the general use of dust collectors. The amounts of sulfur dioxide and dust discharged by the combustion of heavy oils are 20.7 times S kg/ton heavy oil and 3.0 kg/ton heavy oil, respectively, where S is the S content in heavy oils. The amount of SO₂ formed the combustion of a definite amount of heavy oil is 7 times that of dust. However, the ratio between the amount of SO₂ and that of dust is about 0.7-0.9 in a typical city. Most predominant as the source of atmospheric pollution with SO₂ and dust is the combustion of heavy oils, and this difference is not yet understood.

38368

APTIC NO. 61147

Washimi, Michihiro

A STUDY ON AIR POLLUTION INVESTIGATION BY CONDENSATION NUCLEI MONITOR. (Gyoshukukaku monita ni yoru taikiosen chosa ni kansuru kenkyu). Text in Japanese. Kansai Denryoku K.K. Soken Hokoku (Rep. Inst. Kansai Electr. Power Co., Inc.), no. 12:210-214, 1973. 5 refs.

Sulfur dioxide, nitrogen oxides, suspended particulates larger than 0.3 microns, and condensation nuclei of size 0.001 microns were examined in terms of their behavior in the air. The concentration of sulfur dioxide was proportional to the number of condensation nuclei, indicating that the sources of the condensation nuclei and sulfur dioxide present in the air are the same. Condensation nuclei are probably produced by the same process as sulfur dioxide. Nitrogen dioxide concentration also varied closely with the number of condensation nuclei. Thus the condition of air can be judged from the analysis of the concentration distribution of pollutants using the condensation nuclei as a tracer.

38369

APTIC NO. 60348

Ministry of International Trade and Industry, Fukuoka (Japan), Omuta City and Industrial Pollution Control Association

REPORT OF AIR POLLUTION CONTROL POLICY CONFERENCE IN OMUTA AREA. (Omuta chiku taiki osen boshi taisaku kyogikai hokokusho). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 9(12):1213-1220, Dec. 1973.

The Air Pollution Control Policy Conference was established in Aug. 1971 to forecast sulfur oxides pollution in the Omuta area in 1977 by conducting wind tunnel experiments and making use of dispersion calculations. Based upon these studies advice was given to various enterprises on how to prevent pollution. The area is a center of mining and industrial activity

containing a large coal chemistry complex. Six businesses and 48 plants were requested to submit data on some sources in 1977. Using a 1/2500 scale model of the area wind tunnel experiments were conducted with west-northwest and southwest wind directions. Theoretical calculations were made based on Sutton formulas and correction coefficients. Under WNW winds 0.15 ppm SO_x were predicted, and under SW winds 0.16 ppm SO_x were predicted.

38370

APTIC NO. 60768

Gosudarstvennyy Komitet Soveta Ministrov SSSR Po Delam Stroitel'stva

INSTRUCTIONS FOR CALCULATING THE ATMOSPHERIC DISPERSAL OF NOXIOUS SUBSTANCES (DUST AND SULFUR DIOXIDE) PRESENT IN INDUSTRIAL EMISSIONS. In: (American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Atmospheric Pollutants in Relation to Meteorological Conditions: A Procedure for Calculating the Atmospheric Dispersal of Pollutants and the Feasibility of Their Study by Means of Satellites). M. Y. Nuttonson (ed.), Vol. 21, Silver Spring, Md., American Institute of Crop Ecology, 1973, p. 96-141, APTD-1482. Translated from Russian.

Mathematical procedures for calculating the dispersal of noxious industrial substances (dust and sulfur dioxide) in the atmosphere are presented, based on the determination of the concentrations of these substances in the ground layer of air. Topics covered include: calculation of the dispersal of emissions for a single source; dispersal calculation for a group of sources; consideration of the background concentration of noxious substances; recommendations for protection of the air reservoir during operation of industrial facilities; determination of boundaries of the sanitary-protective zone; and tabulation of results for the dispersal calculations. Appendices list industrial facilities covered by the instructions and examples of dispersal calculations.

1972

38371

APTIC NO. 60889

Asami, Teruo

POLLUTION OF PADDY SOIL BY CADMIUM, ZINC, LEAD, AND COPPER IN THE DUST, FUMES, AND WASTE WATER FROM THE NISSO AIZU SMELTER. (Nisso Kinzoku Kabushiki Kaisha Aizu Seirensyo no haiei, haisui ni fukumareru dadomiumu, sen, namari oyobi do ni yoru suiden dojo osen). Text in Japanese. Nippon Dajo-Hiryogaku Zasshi (J. Sci. Soil Sci Manure) (Japan), 43(9):339-343, 1972.

Investigations were conducted in August 1970 on the state of environmental pollution primarily on the rice paddy soil affected by stack gas and liquid waste emitted from Nisso Aizu Smelter. Various soil samples were taken and the predominant pollution factors, either by air or water, were determined. Measurements of cadmium, zinc, lead, and copper were taken. The 1969 production of cathode zinc at this plant was 29,633 tons, electric lead, 2175 tons, and cadmium, 202 tons. In addition, copper, bismuth, gold, silver, arsenic, antimony, and tin were produced. The smelter is located in a valley where the predominant winds are west by northwest and east by south east, and stack gas pollution is prevalent in the east-west direction. The soil samples by air pollution were taken in the direction of main winds: 11 km to east, 5 km to west, 2 km to north, and 3 km to south. The extent of cadmium pollution affected by air reached 17 km from the emission source either to east or west, and 4 km to north and south. The degree of pollution diminished in proportion to the distance from the source. The highest Cd content in the soil was 43.7 ppm and was as high as 20 ppm even at 2 km from the smelter. There was a clear geographical distinction depending on the effects of air or water pollution. The general tendencies of pollution were similar among various metals, and in areas with high Cd

content, other metal contents tended to be high. The lead content was much higher in areas with predominant effects of air pollution.

38372

APTIC NO. 60679

Bary, Elizabeth de, Kirt Bullrich, Reiner Eiden, Guenter Eschelbach, and Gottfried Haenel

RESEARCH ON ATMOSPHERIC OPTICAL RADIATION TRANSMISSION. (FINAL REPORT). Johannes Gutenberg Univ., Mainz (West Germany), Inst. for Meteorology, U. S. Air Force Contract F61(032)-69-C-0016, Proj. 7621-03, 6210F, 681000, Rept. AFCRL-72-0100, 78p., Feb. 1972. 23 refs.

NTIS,DDC: AD-740871

Problems concerning atmospheric optical radiation transmission, radiant fluxes through the atmosphere for clean and polluted atmospheres, and its modification with increasing pollution have been examined. The extinction, scattering function, and degree of polarization as functions of the wavelength and scattering angle appear to be sensitive indicators for the aerosol particle size distribution. Moreover, there is a marked influence on the scattering function in specific angle ranges due to the absorption which is exerted by aerosol particles. The absorption of light by aerosols has an influence on the heating rate in the atmosphere which is of comparable importance to water vapor absorption. Extinction properties of the atmospheric aerosol particles depend on the material of the aerosol, as demonstrated by the complex refractive index; and local and temporal material changes appear to be strongly dependent upon the relative humidity of the air. Measurement results of spectral solar extinction and sky radiances performed at the Hohenpeissenberg Observatory are reviewed.

38373

APTIC NO. 55071

Benarie, M., A. Nonat, and T. Menard

THE TRANSFORMATION OF SULPHUR DIOXIDE INTO SULPHURIC ACID IN RELATION TO THE CLIMATOLOGY OF AN URBAN/INDUSTRIAL AREA (ROUEN, FRANCE). Clean Air Society of Australia and New Zealand, Proc. Int. Clean Air Conf., Melbourne, Australia, 1972, p. 176-186. 38 refs. (May 15-18.)

A series of investigations on the transformation of sulfur dioxide into sulfuric acid during the winter of 1969-70 in Rouen, France were conducted with the aid of a network consisting of seven 24-hour sampling and observation points. Sulfuric acid was determined quantitatively by microdiffusion, and a statistical analysis was performed to study factors which affect the transformation. The investigations showed that the transformation process is dominated by the catalytic effect of solid aerosol present at the same time in suspension. Fog effected a definite reduction in the concentration of sulfuric acid in suspension. The accelerating effect of ammonia and nitrogen dioxide were slight compared with the effect of smoke, and photochemical reactions could not be recognized. A rapid decrease in the proportion of sulfuric acid was observed when the mean temperature rose above 1 C. The average amount of sulfur present occurring as sulfuric acid in the atmosphere of this urban/ industrial city during the winter months was 7.1%; and under the conditions investigated, the transformation rate ranged between 6 and 25% per hour. (Author abstract modified)

38374

APTIC NO. 60627

Dogniaux, R. and R. Sneyers

THE STABILITY OF ATMOSPHERIC TROUBLES AT UCCLE DURING THE 1951-1970 PERIOD. (Sur la stabilité du trouble atmosphérique à Uccle de la période 1951-1970). Text in French. Inst. Roy. Meteorol. Belg. Publ. Ser. A, no. 75:3-15, 1972. 7 refs.

NTIS: N7312882

The evolution of atmospheric troubles due to air pollutants in general, and to carbon dioxide and tropospheric aerosols in particular, at Uccle (Belgium) during the 1951-1970 period was studied. The solar radiation is reduced particularly by the increasing CO₂ and aerosol concentrations in the atmosphere. The atmospheric trouble factor is an indicator of the air pollution level, and as such, it represents the ratio between the extinction of the solar radiation passing the atmosphere, and that passing through an ideal, pure and dry atmosphere. Steady increases in the atmospheric trouble factor during the 1951-1970 period from 4.27 to 4.45 (am) and from 4.30 to 4.55 (pm) was determined. The annual rate of increase in the value of the atmospheric trouble factor was 0.013, corresponding to about 0.3% of the mean value of the trouble factor. The daily and seasonal variations of the atmospheric trouble factor are due to analogous variations in meteorological variables, such as the vapor and ozone contents of the atmosphere.

38375

APTIC NO. 60856

Johnson, Warren B.

VALIDATION OF AIR QUALITY SIMULATION MODELS. North Atlantic Treaty Organization, Brussels (Belgium), Committee on the Challenges of Modern Society, Proc. Expert Panel Air Pollut. Modeling, 3rd Meet., Paris, France, 1972, p. VI-1-VI-9. 2 refs. (Oct. 2-3.)

Techniques for evaluating air quality simulation models are reviewed along with problems associated with AQS model validation and some possible solutions. The basic technique in evaluating each submodel of an AQS model is simply to directly measure the required model input variable, if possible, and then to compare it with the estimates furnished by the submodel from available, gross data. The weakest portion of the entire AQS model is apt to be the emissions module, and currently there is almost no way to evaluate such a module, except through sampling of effluent concentrations from individual sources. An alternative technique that may have some merit involves the use of remote-sensing devices to measure line-integral pollutant concentrations. The area of transport and diffusion requires further evaluation of the horizontal and vertical dispersion coefficients and their dependence upon meteorological conditions, surface roughness, urban structure, and topography. Major uncertainties in the area of transformations involve the importance of gas-to-solid transformations and the effects of turbulent mixing rates on chemical reaction rates. Surface removal rates (deposition velocities) are not known for any of the major pollutants, and these could be significant for those species that react chemically with the surface. The Environmental Protection Agency is planning an extensive multi-year Regional Air Pollution Study in the St. Louis area with the objective of refining and evaluating AQS models for general use of determining least-cost air pollution abatement strategies.

38376

APTIC NO. 60935

Johnson, Warren B.

THE STATUS OF AIR QUALITY SIMULATION MODELING. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 114-127, 143-144. 14 refs. (Oct. 17-19.)

The role of air quality simulation modeling in air pollution control activities is described with reference to the function of other related models; and the formulations, advantages, disadvantages, and limitations of five main model types (Gaussian, fixed cell, moving cell, particle-in-cell, and multiple box) are examined. The most active areas of research outlined are: short-term urban models for quasi-stable pollutants (carbon monoxide, sulfur dioxide, and particulates); emergency control models for SO₂; photochemical models for nitrogen dioxide and ozone; highway models for impact studies and transportation plans; airport models for setting and verifying aircraft emissions standards; urban and mesoscale meteorological

models for air quality prediction; inter-regional transport models; fluid (scale) modeling feasibility studies; empirical modeling involving analysis of air quality data; pollutant removal models; and studies of effects of atmosphere turbulence levels on pollutant reaction rates. Program funding levels of the Environmental Protection Agency for outside modeling research are also discussed.

38377

APTIC NO. 60952

MacCracken, M. C., T. V. Crawford, K. R. Peterson, and J. B. Knox

THE INITIAL APPLICATION OF A MULTI-BOX AIR POLLUTION MODEL TO THE SAN FRANCISCO BAY AREA. Preprint, California Univ., Livermore, Lawrence Livermore Lab., 8p., May 30, 1972. 21 refs. (Presented at the Joint Automatic Control Conference, Stanford, Calif., Aug. 16-18, 1972.)

NTIS: UCRL-73944, CONF 720808-1

Application of the multi-box method, in which the transport and photochemical terms are treated simultaneously as a system of coupled rate equations, offers the potential for treatment of complex areas, rather than being limited to flat topography, uniform meteorology, and nonreactive pollutants. However, this method is more difficult than other air pollution models. The method was applied to the San Francisco Bay Area. A preliminary verification study for carbon monoxide indicated that the treatment of the meteorological data and the resulting transport yielded promising results. Agreement with the observed time history was very good at two of the three major urban observation stations, and the frequency distribution showed a log-normal pattern consistent with short- and long-term observation records. (Author abstract modified)

38378

APTIC NO. 60945

Moses, H.

ATMOSPHERIC TRANSPORT MODELS WORKSHOP 1. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 315-322. (Oct. 17-19.)

Three subgroup reports on atmospheric transport models are presented for the following topics: chemical, physical, and transport processes; verification problems of urban air pollution models; and application of the models to control strategy development and evaluation, land use planning, facility planning, and episode prediction and analysis. Model validation is emphasized in each of the presentations. Computer implementation of the models is also considered both in terms of software and hardware requirements. Future needs regarding atmospheric transport models are outlined in terms of application; interface with planning models; communication of model outputs to users; development of chemically reactive transport models; higher sensitivity models for prediction of low pollutant concentrations and for provision of a high level of disaggregation to allow modeling of single point sources, highways, and urban canyons; and increased quality control over atmospheric transport models.

38379

APTIC NO. 58532

Shirvaikar, V. V., V. Sitaraman, Ramesh K. Kapoor, A. Sundararajan, L. N. Sharma, and P. L. K. Sastry

MICROMETEOROLOGICAL AND ATMOSPHERIC DIFFUSION STUDIES AT NUCLEAR POWER STATION SITES IN INDIA, PART II: ATMOSPHERIC DIFFUSION STUDIES. Indian J. Meteorol. Geophysics, 21(4):529-538, Oct. 1972. 5 refs.

The results of diffusion experiments, using smoke as a tracer, performed at two nuclear power stations in India are reported. Winds, temperature, smoke diffusion runs, and atmospheric turbulence were simultaneously measured. The values of Sutton's diffusion coefficients are related to easily measurable

meteorological parameters such as the stability parameter and the standard deviation of wind direction. The measurements at a plain site on the sea coast show regularity of variation of Sutton's diffusion coefficients with all such parameters. The coefficients are expressed in terms of the stability parameter, which, though without a sound physical basis, is useful for field applications. Such a regularity was not observed at the second site, which is uneven. The wind direction variability at this site is very high, with the result that in a 4-min time exposure photograph as many as three distinct plumes are obtained. The graphs of wind direction variation versus travel distance obtained from Gifford's opacity method show a very high rate of vertical diffusion even under stable conditions at the second site. (Author abstract)

38380

Toropova, T. P.

APTIC NO. 60566

WAVELENGTH DEPENDENCE OF ATMOSPHERIC AEROSOL SCATTERING INDICES. (K voprosu o zavisimosti aerolov noy indikatsiyi pasesyaniya v atmosfere of dilny volny). Translated from Russian. ASCI. U. S. Army Military Command, Foreign Science and Technology Center Proj. T702301 2301, Rept. FSTC-HT-23-401-72, ASCE K-0997, 8p., April 18, 1972. 1 ref. NTIS, DDC: AD 741110

Possibilities were examined for elucidating some of the properties of aerosol indices scattering according to the data available regarding the dispersion of sky brightness along the sun almucantarate. Measurements were performed for wavelengths of 410, 525, 620, and 680 m; photometers with an exit angle of approximately 20 ft were employed for the observation. Measurements were also possible in the area of the coronas near the sun. Observations confirmed the decrease of the indicator of degree (η) with a decrease of the angle of scattering and were evidenced by the fact that during the summer-fall period of 1964 the form of aerosol index was altered to a certain degree with the wavelength.

38381

Wendell, Larry L.

APTIC NO. 60695

A REVIEW OF SOME TECHNIQUES FOR INVESTIGATING MESOSCALE TRANSPORT IN THE PLANETARY BOUNDARY LAYER. North Atlantic Treaty Organization, Brussels (Belgium), Committee on the Challenges of Modern Society, Proc. Expert Panel Air Pollut. Modeling, 3rd Meet., Paris, France, 1972, p. IX-1-IX-13, 1972. 5 refs. (Oct. 2-3.)

Techniques for investigating the mesoscale horizontal variation of wind in the planetary boundary layer and tracer transport are reviewed. Wind field plots resulting from measurements at irregularly spaced towers are examined with respect to the conformity between flow patterns and fishhook-shaped topographical depressions. Transport, represented by wind measurements from these towers, is restricted to a layer in which these measurements are representative. A long series of computer-produced trajectory plots of hypothetical particles based on hourly averaged wind data, interpolated to a regular grid, are also examined and provide an estimate of the climatology of the transport from a given release point for selected release periods. Flow can be measured in a more direct sense by the use of radar to track a constant density balloon. Tetroon trajectories have been compared with wind field derived trajectories, and it appears that if the tetroon flies low enough or there is little vertical wind shear the trajectories are generally quite similar. A knowledge of the thermal stability and data provided by tetroons and a network of wind towers would seem to offer some fairly powerful tools with which to estimate the transport of a tracer.

38382

APTIC NO. 60809

ACIDITY AND SULFATE ION CONCENTRATION OF RAINWATER. (L acidite et la concentration en sulfates des eaux de pluie). Text in French. Tech. Eau Assainissement, no. 31-37, May 1972. (Report issued by the Conference held in Paris, France, June 5-6, 1969.)

A report issued by a conference of West German, Finnish, French, Norwegian, Dutch, British, and Swedish experts concerning the acidity and sulfate ion content of rainwater over Scandinavia in general and Sweden in particular is presented. Systematic measurements conducted for years both in Sweden and in other European countries have confirmed the steady increase in the acidity and the sulfate ion concentration of rainwater in Scandinavian and Central European countries, except in Ireland and the United Kingdom for the last years. Atmospheric transport of sulfur-loaded air masses from one country to another was also observed. The increase in the acidity and the sulfate concentration in the precipitation may be due both to increased sulfur dioxide emissions and to intensified removal of alkaline components from waste gases. Some one-third of the total sulfur emission generated within Sweden is precipitated within the limits of that country, while the rest is transferred to other countries. With unchanged course of the development assumed, soils in Sweden would become unfit for forestry use in about 100 years, while the aquatic life in lakes and rivers is already considerably limited or even suppressed due to increased acidity. Further studies on the atmospheric transfer processes of sulfur compounds, and also of fluorine and oxidants, on an international scale, will be required.

1971

38383

APTIC NO. 60912

Blifford, Irvin H., Jr.

GLOBAL AEROSOL MODEL. National Center for Atmospheric Research, Boulder, Colo., Particulate Models: Validity Appl., Proc., Boulder, Colo., 1970, NCAR-TN/PROC-68, p. 61-72, 247-254, Aug. 1971. 5 refs. (Aug. 21.)

A global aerosol model is described which includes aerosols inside and outside clouds, photooxidation of sulfur dioxide, washout, sedimentation, and coagulation. Some of the rate constants are shown, and processes considered in computation of the tropospheric aerosol are reviewed. The variation of particle size with time, rate constants, and other factors (sedimentation, rain, attachment, coagulation, and photooxidation), is reviewed. A discussion is given.

38384

APTIC NO. 60573

Casper, J. W.

DEVELOPMENT AND STATE OF THE ART OF METEOROLOGICAL STUDIES. (Entwicklung und Stand der meteorologischen Untersuchungen). Text in German. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), Lufthyg.-Meteorol. Modelluntersuch. Reg. Untermain, 4th, Frankfurt am Main, West Germany, 1971, p. 21-32. (Nov. 4-5.)

The organization of, and preliminary results obtained by, meteorological studies commenced in July 1971 in the Lower Main region in West Germany within the framework of an air hygienic and meteorologic model study of that region are described. The stationary meteorologic network measures meteorologic parameters relevant for the dispersion of air pollutants, such as air temperature, wind, relative humidity, and barometric pressure; mobile measuring stations for small-scale aerologic measurements, including temperature and humidity recordings, as well as airborne instruments for infrared temperature measurements during typical weather conditions, are included in the meteorological network. The meteorological

data recorded and stored on magnetic tapes will be used for dispersion calculations according to Fortak's model regarding advective weather conditions with homogeneous wind field, and regarding the local circulation in a second stage of the model.

38385

APTIC NO. 60914

Papez, Antonin

THE RELATION BETWEEN SYNOPTIC SITUATIONS AND AIR POLLUTION IN KOPISTY NEAR MOST. (Vztah mezi synoptickými situacemi a znečištěním vzduchem v Kopistech u Mostu). Text in Czech. *Meteorologické Zpravy*, 24(1/2):37-40, 1971. 11 refs.

The lignite mined in the brown coal basin around Most has a sulfur content of up to 3.6%. Its use as fuel by the local population and industry produces high concentrations of sulfur dioxide and sulfuric acid in the atmosphere. These were determined using a new coulometric instrument. In 1968, the concentration exceeded the permissible level (0.50 mg/cu m air). The concentrations varied, depending on meteorological conditions (turbulence, passing of cold and warm front, precipitation). Macrosynoptic processes affect the accumulation and the dispersal of the noxious fumes less than the micrometeorology and local topography.

38386

APTIC NO. 60683

Pooler, Francis, Jr.

ATMOSPHERIC TRANSPORT AND DISPERSION OF PESTICIDES. Preprint, American Chemical Society, Washington, D. C., 21p., 1971. 6 refs. (Presented at the American Chemical Society, National Meeting, 162nd, Washington, D. C., Sept. 12-17, 1971.)

NTIS: COM-72-10454

Atmospheric dispersion of pesticides was considered in terms of the influences of wind speed, atmospheric stability, and size distribution of the disseminated pesticide. The mechanism for removal of material from the atmosphere, dry deposition, and precipitation scavenging were used to derive estimates of atmospheric residence times of pesticides; and the mean global atmospheric circulation was considered with particular reference to the global spreading of pesticides. Direct continental scale spreading from a source was concluded to be fairly rapid, global spreading being much slower, because residence times are much less than the mean circulation times. Problems in deriving a satisfactory mass budget for persistent pesticides were also considered. (Author abstract modified)

38387

APTIC NO. 60643

Pooler, Francis, Jr.

ATMOSPHERIC TRANSPORT AND DISPERSION OF PESTICIDES. Preprint, American Chemical Society, Washington, D. C., 21p., 1971. 6 refs. (Presented at the American Chemical Society, National Meeting, 162nd, Symposium on Guidelines for Environmental Studies of Pesticides, Washington, D. C., Sept. 12-17, 1971.)

Local transport and large scale dispersion of pesticides are examined in terms of the influences of wind speed, atmospheric stability, and the size distribution of the disseminated pesticide; while the principal mechanism of removal of material from the atmosphere, viz., dry deposition and precipitation scavenging, are used to derive estimates of atmospheric residence times for pesticides. Large droplets with an appreciable fall velocity are least influenced by atmospheric turbulence, and virtually all will fall out within a distance proportional to the product of the height of release times the wind speed, divided by the fall velocity. Small particles with negligible fall velocity are displaced vertically only by the turbulence; hence, the pattern of airborne dosage and the resultant surface deposition pattern depend primarily on atmospheric turbulence, with the downwind stretching of these patterns proportional to the wind speed. The integrated depletion of air-

borne material by surface deposition can be an important factor when considering greater time and space scales. Precipitation scavenging (rainout and washout) depends on the physical and chemical properties of the materials, the size and number distribution of the precipitating elements, and the cloud physics responsible for the growth of these elements. Direct continental scale spreading from a source can be fairly rapid since residence times are much less than the mean circulation times; global scale spreading should be much slower.

38388

APTIC NO. 60927

Selby, J. E. A.

DROP SIZE MEASUREMENT IN LOW-LEVEL STRATUS. National Center for Atmospheric Research, Boulder, Colo., Particulate Models: Their Validity Appl. Proc., Boulder, Colo., 1970, NCAR-TN/PROC-68, p. 191-199, 247-254, Aug. 1971. 3 refs. (Aug. 21.)

The attenuation of laser radiation in a cloud was studied at a mountain site in north England. The attenuation was measured at 0.63, 1.15, 3.39, 10.6, and 337 micron relative to that at 0.63 micron over a fixed path length. The cloud drop size distribution and attenuation were measured, and the former was used to make a theoretical estimation of the attenuation at each wavelength based on scattering theory. The correlation between visual range and visible and infrared attenuation was investigated. Two types of distribution were generally found. One exhibited a sharp peak at about 2 micron radius and contained 1000 (+ or - 500) drops/cu cm, with a half-width of approximately 2 micron. The other was a wider distribution (6 micron half-width), sometimes bimodal with maxima at about 1.5 and 4 micron radius, containing about 250 drops/cu m. The radii of the measured droplets were in the range 0.8-17 micron. The calculated attenuations based on drop size measurements generally agreed with the measured attenuation values to within a factor of two. The disagreement between the two results probably resulted from a combination of sampling errors and from spatial variations in the cloud. There was an apparent absence of droplets in excess of 20 micron and a large abundance of small drops of about 2 micron radius. A discussion is given.

38389

APTIC NO. 60915

Sramek, Ladislav

THE CURRENT STATUS OF THE RAIN WATER POLLUTION. (Soucasny stav znečištění srážkových vod). Text in Czech. *Meteorologické Zpravy*, 24(3/4):70-71, 1971. 5 refs.

Studies undertaken during the International Geophysical Year (1958) in the same general area were repeated in the Ohre river basin in 1968. A semi-automatic collecting device was used to separate local pollutants (solids) from the pre-existing ion content of the cloud. The chloride and calcium ions, and nitrogen dioxide, nitrogen trioxide, and ammonia concentrations were substantially higher than 10 years earlier; the pH was also higher. The NH₃, nitrite and nitrate concentrations in the rain water exceeded the permissible levels set for drinking water.

38390

APTIC NO. 59228

Swedish Preparatory Committee for the United Nations Conference

AIR POLLUTION ACROSS NATIONAL BOUNDARIES THE IMPACT ON THE ENVIRONMENT OF SULFUR IN AIR AND PRECIPITATION. 96p., Aug. 1971. 43 refs.

The environmental effect in Sweden of sulfur in the air and in precipitation was investigated. The direct effects of sulfur dioxide in the air are confined to the areas in the immediate vicinity of the emission sources. The average time sulfur remains in the air is 2-4 days. It is transported more than 1000 km before it is deposited on the ground, and the harmful effects caused by the deposition of sulfuric acid may be felt far from the source. The effect of the deposited sulfur depends on

what other substances reach the ground via the air. The local damage due to SO₂ in the air may affect human health, metallic materials, painted surfaces, and certain surfaces of buildings, and vegetation. Damage as a result of deposition of excess H₂SO₄ may affect arable land, forests, rivers, and lakes. The consequences of the development of SO₂ concentrations and S deposits in urban areas are discussed, and four different alternatives are discussed. (Author summary modified)

1970

38391

APTIC NO. 60837

Chassaing, P. and A. Claria

DEVELOPMENT OF A PROCESS FOR THE MEASUREMENT OF FLOW RATES AND CONCENTRATIONS IN GASEOUS PHASE. REDUCED-SCALE MODEL STUDY OF A TWIN-DUCT STACK WITH CIRCULAR CROSS SECTION. (Mise au point d'un procede de mesure de vitesse et concentration en phase gazeuse. Etude sur modele reduit d'une cheminee a section circulaire et a deux conduits). Text in French. Inst. National Polytechnique de Toulouse (France), Inst. de Mecanique des Fluides, Rept. 5623, 44p., Nov. 6, 1970.

Measurements of the flue gas flow rates in a stack by means of hot-wire anemometers and a model of flue gas dispersion from a twin-duct stack with a circular cross section are described. The flow rates at the tops of the two ducts were different, and additional lift was given to the plume by air blow through a ring gap. The system was efficient provided good dispersion when the rate of windward discharge was higher than that on the lee side. The flue gas jet discharged at an increased flow rate entrained the jet emitted at low flow rate. The air jet discharged through an annular gap reduced the effect of the wind, and thus increased the lift of the flue gas jet. It also increased the draft at the top of the stack due to its flow rate being greater than that of the flue gas jet. The vertical component of the smoke plume velocity remained at considerable value even at distances of over 30 stack diameters.

38392

APTIC NO. 60608

Klug, W.

DISPERSION OF POLLENS IN THE ATMOSPHERE AS EXEMPLIFIED BY AMBROSIA IN AMERICA. (Ausbreitung von Pollen in der Atmosphaere, dargelegt am Beispiel von Ambrosia in Amerika). Text in German. Kommission zur Erforschung der Luftverunreinigung (West Germany) and Deutsche Forschungsgemeinschaft, Kolloq. Allerg. Pollen Sporen, Darmstadt, West Germany, 1970, p. 28-33. 1 ref. (April 14.)

The dispersion of Ambrosia pollens was studied by means of slide-edge cylinders placed at different distances from the plants in an annular pattern. Decrease in the pollen concentration with that of the sampling from 5 to 15 m, and with distance from the source in the wind direction was determined. The distance-dependent decrease in the pollen concentration was most pronounced in cases when the wind speed was low. The influence of the local source of pollens was detectable within a radius of about 200 m.

38393

APTIC NO. 56761

Morawska-Horawska, M.

FINDINGS ON THE DISPERSAL OF SO₂ IN DEPENDENCE ON THE METEOROLOGICAL CONDITIONS. Air Conserv. (English translation from Polish of: Ochrona Powietrza), 4(6)(20):40-45, 1970. 2 refs.

NTIS: TT 70-55214/6

Average daily, seasonal, monthly, and annual concentrations of sulfur dioxide are given for the towns of Czyzyny, Wolica, Piaski, and Hysne, and the data is analyzed in relation to fac-

tors possibly affecting it. The highest annual average value of SO₂ concentrations over the period 1967-1968 occurred at Czyzyny, and a similar annual average occurred at Wolica. Great differences in SO₂ concentrations among Wolica, Piaski, and Hysne were not justified by their distance from nearest urban or industrial areas; and, presumably, the low concentrations of SO₂ at Piaski and Hysne were due to the situation of these settlements on the border of the Niepolomice Forest which plays the role of a natural filter retaining the polluted air. Higher concentrations at Hysne compared to Piaski may have been due to differences in local micro-circulation or to the influence of industrial centers situated eastward from the Niepolomice Forest. Wind studies indicated that SO₂ concentrations occurring while winds blow from the western part of the horizon constitute from 80-89% of the total concentration. Highest concentrations of SO₂ occurred during the blowing of winds from the southwestern quadrant, except for Wolica.

38394

APTIC NO. 60685

Shirvaikar, V. V., V. Sitaraman, Ramesh K. Kapoor, A. Sundararajan, L. N. Sharma, and P. L. K. Sastry

MICROMETEOROLOGICAL AND ATMOSPHERIC DIFFUSION STUDIES AT NUCLEAR POWER STATION SITES IN INDIA. PART I: WIND PROFILE STUDIES. Indian J. Meteorol. Geophysics, 21(3):361-366, 1970. 15 refs.

Wind profile data collected from micrometeorological and atmospheric diffusion studies conducted at the Tarapur nuclear power station in India were analyzed and compared to similar data from various sites in the United States. The roughness parameter was determined from profile measurements made under adiabatic conditions, using the friction velocity and Von Karman's constant (0.41). Values for the friction velocity were estimated from wind speeds at one and two meters assuming an adiabatic profile up to these heights. The shear function involving the non-dimensional wind shear was used to demonstrate that the analysis is critically dependent upon the value of the roughness parameter; the function tended to be of constant value when plotted against the stability parameter.

1969

38395

APTIC NO. 60713

Landsberg, H. E.

BIOMETEOROLOGICAL ASPECTS OF URBAN CLIMATES. Maryland Univ., TN-BN-620, National Science Foundation Grants GA-1104 and 13353, 14p., Sept. 1969. 14 refs. (Presented at the Biometeorological Congress, 5th Montreux, Switzerland, Aug. 31-Sept. 6, 1969.)

In industrialized nations, 70-80% of the population live in urban areas. The proportion of urban dwellers is rapidly increasing throughout the world. Cities create their own mesoclimate which departs more from the natural macroclimate as the city area increases and as the population grows denser. Some recent observations in the town of Columbia, Maryland are reported. This city is growing out of a previously rural area. Quantitative values of the changes in meteorology caused by urbanization are presented. The urban heat island effect has increased. The first attempt to quantify the energy balance of individual segments of the area gave considerable differentiation within short distances. In Columbia, cloudy days had no differences in midday air temperature, but on clear days, temperature increased in the built-up areas due to the heat island effect. Temperatures varied on different types of surfaces and over different environments. The more urbanized areas had greater infrared surface temperature values than more rural areas such as lakes and woods. Relative humidity was generally less at more urban areas. Advective effects of air pollution for communities built within a megalopolitan enclave were studied. The central city effects can extend far into suburban areas. These studies have important implications for city planning and redevelopment. The sulfur dioxide concentrations

winds, and turbidity were measured at various sections of the Washington, D. C. area. Under stagnation conditions, turbidity (particulate load in micrograms/cu m) measurements were 193, 213, 136, 68, and 58 at Washington, D. C., Silver Spring, Md., College Park, Md., Columbia, Md., and Clarksville, Md., respectively. (Author abstract modified)

38396

APTIC NO. 60661

Vososhin, V. G.

THE QUESTION OF THE CONNECTION BETWEEN THE TURBULENCE COEFFICIENT AND TEMPERATURE AND WIND DISTRIBUTION IN THE LOWER 300-METER LAYER. *Meteorol., Klimatol. i Gidrol.*, no. 5:90-94, 1969. 6 refs. Translated from Russian by J. Miller, Air Force Systems Command, Foreign Technology Div., FTD-HT-23-1200-71, 12p., Dec. 15, 1971. 6 refs.

NTIS, DDC: AD 739221

The relationship between the turbulence coefficient and the temperature and wind distribution was examined for the lower 300 m layer. The dimensionless function $F(B)$, which has been previously proposed to have the turbulence coefficient dependent on it, was found from data of observations on the 300 m mast of the Institute of Applied Geophysics; and the form of the function $F(B)$ obtained from data on synchronous temperature and wind measurements confirmed the presence of the dependence of $F(B)$ on B in the lower 300 m layer of the atmosphere.

1967

38397

APTIC NO. 60594

Lowry, W. P.

AIR POLLUTION METEOROLOGY. In: *Weather and Life*, New York, Academic, 1967, Chapt. 16, p. 280-288, 293. 5 refs.

The microscale and macroscale aspects of the diffusion of air pollutants are discussed. Smoke particles move outwardly from a common point. Diffusion may take place equally in air directions or may be superimposed on underlying flow. The five basic types of plume and the lapse rate conditions producing them are illustrated. Mathematical models exist with which to estimate the mean concentrations at any point in space downstream from a continuous point source, but the accuracy of the models is only moderately good. The atmosphere disperses and dilutes contaminants. These effects usually occur together since moving air becomes turbulent and mixes the contaminants throughout its entire volume. A schematic model relating diurnal and seasonal potentials of the atmosphere for dispersion of air pollutants on the mesoscale is presented.

BASIC SCIENCE AND TECHNOLOGY

1974

38398

APTIC NO. 60420

Abe, Takao, Mitsunori Sukigara, and Kenichi Honda

SINGLET OXYGEN AND ITS PHOTOCHEMICAL REACTIONS. (Ichijuko sanso to sono kanyo suru kokagaku hanna). Text in Japanese. *Seisan-Kenkyu (Prod. Res.)*, 26(2):31-37, Feb. 1974. 89 refs.

Studies on singlet oxygen are comprehensively reviewed. The studies made a dramatic progress between 1950 and 1960s, but now singlet oxygen is suspected as a contributor to the formation of photochemical smog. The topics of discussion include: the energy transfer mechanism; electron structure; the life span, formation process; electric discharge, photodegradation;

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AIR POLLUTION ABSTRACTS, AUGUST 1974

direct excitation, chemical formation; identification methods by spectrometry, iodimetric potential, and thermoanalysis; and various chemical reactions of singlet oxygen. The contribution of singlet oxygen to the formation of photochemical smog is not yet clear. There are five theories of the formation process of singlet oxygen in the air: basic oxygen is directly excited by the sun; aldehydes, ketones, and aromatic compounds are excited by the sun and the energy transfers to basic oxygen; ozone is photodegraded; it is produced as a by-product of thermal reaction; and oxygen-olefin collision complex absorbs ultraviolet ray.

38399

APTIC NO. 61246

Aoki, Toyooki, Koji Kitano, and Makoto Munemori

THE EFFECTS OF SULFUR DIOXIDE ON THE PHOTOCHEMICAL REACTION OF HYDROCARBON-NITROGEN OXIDES. (Tanka suisu-NOx kei no kokagaku hanna ni taisuru SO₂ no eikyo). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 684, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974. Paper 1G29.)

The photochemical reaction was carried out by using a 20-l Pyrex flask as a reaction chamber and a black light having a maximum radiation intensity of 360 nm. The analyses of gases were conducted by gas chromatography, hydrocarbons with a flame ionization detector, and sulfur dioxide by flame photometric detector. The initial concentrations of hydrocarbons were 100 ppm and those of sulfur dioxide and nitrogen dioxide were 12 ppm. The reaction temperature was 33 + or - 3 C. In the hydrocarbon-NO₂-O₂ systems, olefins had the highest reactivity while aromatic compounds had the lowest. Sulfur dioxide reduced the reactivity of propylene which showed the highest reactivity among those investigated. Propylene gave little change after 60 min of irradiation in the absence of NO₂.

38400

APTIC NO. 61243

Arakawa, Tsuyoshi, Toshio Matsuda, Takeshi Kondo, Yusaku Takita, Isao Mochida, and Tetsuro Seiyama

CATALYTIC REDUCTION OF NITRIC OXIDE. (No no sesshoku kangen bunkai hanna). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 286, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974. Paper 2C41.)

Various catalysts were tested for the catalytic reduction of nitric oxide. Interesting reactions of Y-type zeolites ion-exchanged with metals were noted for NO reduction by ammonia, especially when exchanged with valuable metals such as platinum and palladium. The composition of test gas was NO 3%, ammonia 2%, and helium 95%. Catalysts were heated and dehydrated for 2 hr in helium, at 150 C, before experiments. All analyses were conducted by gas chromatography. Addition of copper to the catalyst increased activity in the low temperature zone, but addition of nickel, iron, and chromium had no effect on catalytic activity. When oxides of molybdenum or phosphorus were added, activity decreased. Activities and temperature dependency of various catalyst in NH₃ reduction decomposition of NO were recorded in graphs. Extremely high activity was obtained when the zeolite catalyst contained Pd or Pt. The activity of copper oxide could be maintained by exchanging copper ion on zeolite, and a certain amount of activity remained even at a very low temperature. Iron-zeolite catalyst activity was considerable in spite of its extremely low ion exchange rate.

38401

APTIC NO. 60386

Brain, Joseph D., Peter A. Valberg, Sergei P. Sorokin, and William C. Hinds

AN IRON OXIDE AEROSOL SUITABLE FOR ANIMAL EXPOSURES. *Environ. Res.*, 7(1):13-26, Feb. 1974. 21 refs.

A method for generating an iron oxide aerosol suitable for animal exposures is presented. Submicronic oxide particles are produced from the combustion of iron pentacarbonyl; carbon monoxide levels can be kept below 5 ppm with mass concentrations as high as 340 mg/cu m by maintaining furnace temperatures above 450 C with a residence time longer than 20 sec. The aerosol is suitable for animal exposures since it is relatively nontoxic and is easily quantitated by techniques of chemical analysis. The particles reach the pulmonary alveolar surface where they are readily recognized by light and electron microscopy. The aerosol is ideal for use in morphological studies on the pathways of particle clearance in the lungs. (Author abstract modified)

38402

APTIC NO. 61352

Cook, Thomas J. and Terry A. Miller

PRODUCTION OF SUPERScript 1 DELTA SUBScript G O₂ FROM MICROWAVE DISCHARGES IN CO₂, NO₂ AND SO₂. Chem. Phys. Letters (Amsterdam), 25(3):396-398, April 1, 1974. 14 refs.

The production of superscript 1 delta g oxygen in microwave discharges in carbon dioxide and nitrogen dioxide has been confirmed by the observation of its electron paramagnetic resonance (EPR) spectrum. Quantitative measurements of the EPR spectra of superscript 1 delta g and superscript 3 summation operator + g O₂ and superscript 3 p oxygen atoms yield conversion efficiencies for these species. These combined measurements show that the observed superscript 1 delta g O₂ is not formed by simple excitation of superscript 3 summation operator + g O₂ formed in the discharge. Rather there must exist a direct mechanism for the production of superscript 1 delta g O₂ from CO₂ and NO₂. The sulfur dioxide discharge products give rise to no superscript 1 delta g O₂ EPR spectrum. (Author abstract)

38403

APTIC NO. 60402

Dharmarajan, Venkatram and Philip W. West

A PRECISE METHOD FOR THE GENERATION OF STANDARD METAL SALT PARTICULATES. Anal. Chim. Acta, 69(1):43-48, March 1974. 2 refs.

A method for the production of standard dusts which are suitable for calibration and verification of methods to be used for the analysis of hazardous airborne particulates is described. Metal-containing particulate samples are generated by aspirating solutions containing metals of interest into an atomizer burner employing an oxygen-acetylene flame. The particulates thus generated are collected by means of a miniature stack by conventional isokinetic sampling techniques. The particulate samples are deposited on filter tapes and are suitable for calibrating trace analytical methods. Particulate samples containing one or more metals, in any desired ratios of their concentrations, can be generated within a size range corresponding to the respirable range, i.e., 0.1-5 micron. (Author summary)

38404

APTIC NO. 61179

Di Giovanni, P. R. and S. L. Lee

IMPULSIVE MOTION IN A PARTICLE-FLUID SUSPENSION INCLUDING PARTICULATE VOLUME, DENSITY, AND MIGRATION EFFECTS. J. Appl. Mech., 41(1):35-41, March 1974. 26 refs. (Presented at the American Society of Mechanical Engineers, Applied Mechanics Western Conference, Stanford Research Inst., Menlo Park, Calif., Sept. 17-19, 1973, Paper 73-APMW-18.)

Velocity and particulate volume distributions are obtained from the approximate continuum representation of a suspension of uniformly distributed small spherical solid particles for flow induced by impulsive motion of an infinite flat plate; such studies of fluid or gas throughout which are distributed uniform solid spherical particles are of interest for areas such as flow-through packed beds, environmental pollution, com-

bustion, and propulsion. Included in the analysis are major effects of the fractional particulate volume, which is assumed to vary due to the inclusion of the particle slip-shear lift force, as well as a generalized drag interaction force. The lift force results in an accumulation of particles near the wall for both small and large times. Motion in the horizontal direction is determined in terms of modified similarity variables for large and small times, indicating an increase or decrease in the viscous boundary layer for small times depending on the fractional volume of particles and an increase or decrease for large times depending on whether the particles are lighter or heavier than the fluid. The skin friction on the wall increases or decreases to 0 for small times depending on whether the ambient fractional particulate volume is greater or less than 1/4. The friction increases for heavy particles and decreases for light particles for large times. An estimate is used for boundary-layer flow past a semi-infinite flat plate by using the modified Rayleigh's method. (Author abstract modified)

38405

APTIC NO. 61094

Foerg, W. and R. Fabian

PRODUCTION OF CARBON MONOXIDE AND HYDROGEN FROM NATURAL GAS. (Bereiding von koolmonoxyde en waterstof uit aardgas). Text in Dutch. Polytech. Tijdschr., Ed. Procestechiek (The Hague), 29(5):154-156, 1974.

A continuous process for the production of hydrogen and high-purity carbon monoxide, as required for the synthesis of isocyanates, from Groningen natural gas is described. The natural gas to be cracked is purified for the removal of nitrogen and carbon dioxide at a low temperature, after which steam is reformed by a nickel catalyst on a ceramic support at 850 C. After CO₂ is removed from the cracked gas by the use of monoethanolamine, the gaseous mixture composed of hydrogen, methane, and CO is fractionated at low temperature.

38406

APTIC NO. 61258

Fujimoto, Kaoru, Naoki Ozeki, Hiroo Tominaga, and Taiseki Kunugi

CATALYTIC REDUCTION OF NITROGEN OXIDES BY CARBON MONOXIDE. (Issanka tanso ni yoru chisso sankabutsu no seashoku kangen hango). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 279, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 2C34.)

Experiments were conducted on catalytic activities of metals and metal oxides in the catalytic reduction process of nitric oxide by carbon monoxide. A fixed bed system was used at 100-600 C, 1.0-5 g catalyst/hr/mole of NO-CO gas diluted by helium, and analysis was by gas chromatography. The order of activity was, in descending order copper, chromium, iron, nickel, cerium, cobalt, palladium, platinum, and alumina. The conversion rate of the copper catalyst was approximately 60% even at 200 C. The least active alumina converted about 30% at 600 C. The relationship between the material gas partial pressure and NO conversion rate was studied with Cu and Fe catalysts. The NO conversion rate at 600-43000 ppm NO (NO:CO ratio 1:4) was approximately constant. The Cu catalyst showed strong signs of oxygen poisoning at 180 C and nitrogen formation was inhibited and carbon dioxide formation dropped. With the Fe catalyst, N₂ formation was impaired at 380 C, but CO₂ formation was enhanced.

38407

APTIC NO. 61195

Iida, Hiroshi, Hiroo Niiyama, and Etsuro Echigoya

CATALYTIC REDUCTION OF NO BY C. (NO no CO ni yoru seashoku kangen). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 280, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 2C35.)

Catalytic reduction of nitric oxide by carbon monoxide was tested over various carrier metal oxides catalysts and precious metal catalysts. Catalytic activities, the reaction mechanism, the relationship of oxidation and reduction, and nitrogen selectivity were examined. All catalysts of metal oxides had gamma-alumina carrier in the ratio of 5:95, and precious metal catalysts were 0.25% of carriers. One hour of hydrogen pretreatment at 500 C was given. Analyses were conducted by gas chromatography. High activities were noted in copper, rhodium, ruthenium, and palladium. The platinum catalyst, which showed a high activity in nitric oxide and hydrogen, showed a low activity in this experiment. Carbon monoxide in the material seemed to obstruct the activity. An observation of NO partial pressure and the effect of CO partial pressure seemed to suggest the redox mechanism. When the NO-CO reaction was repeated after sending an oxygen pulse to the catalyst, both activity and N₂ selectivity decreased (20 to 2% and 90 to 7%). The Cu catalyst under the normal progress of NO-CO reaction seemed to have properties close to metallic copper.

38408

Ito, Mutsuhito and Masahisa Narita

APTIC NO. 61250

QUANTITATION OF FUEL SULFUR CONTENT BY FLUORESCENCE X-RAY SPECTROPHOTOMETRY ANALYSIS. (Yoeki keiko X-sen bunseki-ho ni yoru juyuchu io no teiryu). Text in Japanese. Tetsu to Hagane, 60(4):206, March 1974. 2 refs.

A sulfur content analysis method applicable to solid and liquid forms of fuel oil was investigated. A fluorescence x-ray analyzer with helium was used. A good reliability is obtained by the same constant method of packing the liquid holder. Such a device was developed using a stabilizer for the mylar membrane of the liquid holder. A good measurement for sulfur was obtained in 40 sec. When the He gas flow rate was 5 l/min, flush time 60 sec, and He flow time while measuring was 1 l/min a good stable measurement was obtained. When analyzing solid fuel oil, it was first heated to 50 C and poured into the holder and the same method as the liquid measurement was applied. This method yielded good accuracy, comparable to the oxygen combustion tube method. A calibration line was prepared using standard fuel materials and compared with the calibration of the oxygen combustion tube method. The difference was 0.018%. Analysis time for 10 samples was about 60 min and was an improvement over the combustion tube method.

38409

James, F. C., J. A. Kerr, and J. P. Simons

APTIC NO. 61347

CHEMICAL AND PHYSICAL QUENCHING OF EXCITED SULPHUR DIOXIDE. Chem. Phys. Letters (Amsterdam), 25(3):431-434, April 1, 1974. 13 refs.

The results of flash photolysis experiments with sulfur dioxide at wavelengths greater than 225 nm, in the presence of large excesses of argon or methane are presented. Sulfur oxide and vibrationally excited SO₂ have been detected as transient products of the quenching of electronically excited SO₂. The SO is produced through self-quenching of a non-emitting metastable triplet state of SO₂, believed to be the superscript 3 A(2) state and not the phosphorescent superscript 3 B(1) state as was previously thought. (Author abstract modified)

38410

Kasaoka, Shigemitsu

APTIC NO. 61194

TECHNICAL FOUNDATIONS FOR NITROGEN OXIDES ELIMINATION TREATMENT METHODS. (Chisso sankabutsu joka shori no kogaku kiso). Text in Japanese. Kankyo Gijutsu (Environ. Conservation Eng.), 3(4): 243-258, April 1974. 13 refs.

Various methods of nitrogen oxides treatment, such as catalytic oxidation, adsorption, catalytic reduction, catalytic

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degradation, and neutralization are reviewed from the basic engineering point of view. The transfer phenomena attendant in solid catalytic reactions gas-solid adsorption, and the digestion carrier catalyst model are chemically and mathematically analyzed. For evaluation of activation speed and general designing of a treatment system, transformation phenomena must be studied. The phenomena that must be considered include: the transfer of heat from fluid material to the entrance and surface of catalytic material, surface adsorption of fluid body, the chemical reaction and separation of fluid body formation, dispersion of residual fluid bodies in pores, adsorption of fluid body formation in the inner walls of pores, reaction chemistry of adsorbed fluid body, its heat and heat absorption, separation of formed fluid substances from the inner surfaces of pores, and the material transfer of formed fluid substances.

38411

Liu, Benjamin Y. H. and David Y. H. Pui

APTIC NO. 61251

A SUBMICRON AEROSOL STANDARD AND THE PRIMARY, ABSOLUTE CALIBRATION OF THE CONDENSATION NUCLEI COUNTER. (J. Colloid Interface Sci., 47(1):155-171, April 1974. 31 refs.

A submicron aerosol generator which combines pneumatic atomization with electrostatic classification to produce uniform particles from 0.01-0.5 micron at concentrations up to a million particles/cc is described in terms of its design and use for production of sodium chloride aerosols as absolute calibration standards for condensation nuclei counters. The particle diameter accuracy of the aerosols produced is about 2%, and the concentration accuracy about 5%. Calibration results are presented showing that an Environment/One (Model Rich 100) counter has a linear response at concentration levels up to 130,000 particles/cc, but the indicated concentration based on the accepted Nolan-Pollak standard is lower than the actual concentration by a factor of 2.5. Above an aerosol concentration of 130,000 particles/cc, the instrument response becomes nonlinear, though the response is independent of particle size in both the linear and nonlinear ranges. Similar studies of a General Electric counter indicate that the instrument response is linear to the highest concentration level (65,000) used in the studies. The accepted Nolan-Pollak standard is in wide variance with the electrical standard used in the studies.

38412

Lutz, Wolfgang, Martin Buelow, Andreas Grossmann, and Wolfgang Schirmer

APTIC NO. 61485

SINGLE GAS AND MIXTURE ADSORPTION OF HYDROGEN SULFIDE AND N-BUTANE ON NACAA-ZEOLITE. I: SINGLE GAS ADSORPTION EQUILIBRIA OF HYDROGEN SULFIDE AND N-BUTANE ON NACAA-ZEOLITE. (Zur Einzelgas- und Gemischadsorption von Schwefelwasserstoff und n-Butan an NaCaA-Zeolith I. Einzelgasadsorptionsgleichgewichte von Schwefelwasserstoff und n-Butan an NaCaA-Zeolith). Text in German. Chem. Tech. (Berlin), 26(4):222-225, April 1974. 25 refs.

The adsorption isotherms of n-butane and hydrogen sulfide on NaCaA-zeolite within the temperature range of -34 to 148 C are presented. The adsorption equilibrium of n-butane was not reached at temperatures below room temperature and that of hydrogen sulfide below 0 C. At the direct measurement of the adsorption isotherms the equilibria for both systems was reached also at temperatures below 0 C. The boundary adsorption values and the adsorption heats determined from the equilibria data are presented and discussed.

38413

Maeda, Yasuaki, Kazuo Kozaru, and Makoto Munemori

APTIC NO. 61597

THE ROLE OF HYDROCARBONS IN THE PHOTOCHEMICAL OXIDATION REACTION OF NITRIC OXIDE. (NO no kogagaku sanko hanno ai okeru tanka suiso no yasuwari). Text in Japanese. Preprint,

Japan Chemical Society, Tokyo, p. 685, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G30.)

Light irradiation was given to various hydrocarbons, nitric oxide, and nitrogen dioxide in a dark place in the presence of aldehydes and alcohol, and reactions were compared. Irradiation was done in a pyrex chamber with blacklight. The NO₂ was measured by the Saltzman method, and NO was measured by the same method after oxidizing by potassium permanganate solution. When there were no coexisting substances, NO irradiation did not produce NO₂. In the presence of olefin HCs, or nonsaturated aldehydes, NO oxidized within 1 hr. Aromatic HCs and paraffin HCs barely enhanced oxidation. Coexisting carbon monoxide and carbon dioxide did not affect oxidation. On the other hand, NO₂ decomposition by irradiation was interfered with by HCs. The copresence of sulfur dioxide with HC did not show any effect on formation of NO. In a dark place, without organic compounds, NO oxidized into NO₂ gradually. The presence of butadiene and acrolein accelerated NO oxidation. When concentration of HCs was increased, the speed of NO oxidation increased.

38414

APTIC NO. 61169

Matsukawa, Fumio, Yoshikazu Mano, and Fumio Nozaki

CATALYTIC REDUCTION OF NO BY CO. (NO no CO ni yoru sesshoku kangen hanna). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 281, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 2C36.)

Nitric oxide reduction by carbon monoxide was examined by the flow method and the pulse method, using platinum, copper chromite, uranium oxide and iron oxide as catalysts. Gas chromatography analyses were made. The order of activity was, in descending order, copper chromite, uranium oxide, iron oxide, and Pt. But in the high conversion rate zone, the U catalyst and Fe catalyst activities were lower than Pt, and these catalysts in the high conversion area had small temperature dependency. The temperature dependency of nitrogen selectivity suggested a two-stage progress of NO reduction: from NO to nitrous oxide, then to N₂. With oxide catalysts, the formation of N₂O in the lower temperature area was outstanding. When the reduced U catalyst was given a NO pulse, the effect of CO reduction temperature showed prominently on the NO conversion rate; but copper chromite and copper oxide catalysts showed almost no effects. This seemed to suggest the progress of NO-CO reaction as a cycle of oxidation-reduction; but more experiments on partial pressure dependency must be carried out for each catalyst.

38415

APTIC NO. 61115

Mirabel, Philippe and Joseph L. Katz

BINARY HOMOGENEOUS NUCLEATION AS A MECHANISM FOR THE FORMATION OF AEROSOLS. *J. Chem. Phys.*, 60(3):1138-1144, Feb. 1, 1974. 22 refs.

The rates of nucleation of liquid aerosols from the gaseous mixtures of sulfuric acid plus water and nitric acid plus H₂O at 25 C for various relative humidities (10-100%) and various activities of acid vapor were calculated using the Flood-Neumann-Doering-Reiss-Doyle theory of binary homogeneous nucleation. The activities of acid vapor needed for nucleation were 25-300 times smaller for the sulfuric acid and water mixture than for the nitric acid and water mixture due to the much larger free energy of mixing in the liquid phase for the former mixture. Conversion from activities to actual pressures resulted in concentrations of HNO₃ which were much too high to be found under normal atmospheric conditions. Concentrations of H₂SO₄ vapor needed to nucleate droplets in the H₂SO₄ plus H₂O system were, on the other hand, in the range of 4 times 10 to the minus 5 to 1.3 times 10 to the minus 2 ppm, a concentration which could result from photooxidation of sulfur dioxide in the atmosphere. A generalized version of the Kelvin equation which included the composition depen-

dence of the surface tension for a binary mixture was derived and applied to the calculation of growth curves for H₂SO₄ plus H₂O droplets (radius versus composition) at various relative humidities from the critical radius up to a 1000 Å radius, corresponding to nuclei large enough to serve as condensation centers for heterogeneous nucleation. The limitations of the binary homogeneous nucleation theory at extremely low concentrations of one of the components were examined, and the theory was shown to be inapplicable if the actual vapor pressure of one component is below 10 to the minus 6 torr. (Author abstract modified)

38416

APTIC NO. 60384

Miyamoto, S., R. J. Prather, and H. L. Bohm

NITRIC OXIDE SORPTION BY CALCAREOUS SOILS: II. EFFECT OF MOISTURE ON CAPACITY, RATE, AND SORPTION PRODUCTS. *Soil Sci. Soc. Am. Proc.*, 38(1):71-74, Jan.-Feb. 1974. 8 refs.

The effect of moisture on capacity, rate, and sorption products was investigated for nitric oxide sorption by calcareous soils. The NO sorption capacity at room temperature increased with the presence of moisture in an air plus NO stream (1.5% NO by volume) and/or in the soils. The largest increase, up to 10-fold or approximately to the acid-titratable basicity of soils, occurred when NO and water were sorbed simultaneously by initially dry soils from a moist air (95% humidity) plus NO stream. The sorption rates were proportional to the unused portion of the capacity, the rate constants ranging from 0.02-0.03/min for NO and 0.01-0.015/min for H₂O under simultaneous sorption. Initially moist soils sorbed NO from a dry air (less than 5% humidity) plus NO stream until the soils dried. The rate of NO sorption slowed at initial soil water suctions less than approximately 1 bar. Sorbed NO was recovered as nitrate and reacted with the basicity in moist soils. Less than 20% of the sorbed nitrogen was lost upon heating at 105 C for 24 hr. Data is applicable to controlling waste gases by solid sorbents.

38417

APTIC NO. 61399

Moerl, Lothar

PRESSURE LOSS IN UNIFORMLY MOVING SOLID PARTICLE LAYERS PASSED BY GASES. (Druckverlust eingeschlossenen bewegten, gasdurchstroemten Feststoffteilchenschuettungen). Text in German. *Chem. Tech. (Berlin)*, 26(4):212-218, April 1974. 31 refs.

An equation was derived to calculate the pressure loss in uniformly moving particle layers. The results were compared with experimental investigations. The generally valid relationship of the modified Euler number being a function of the Reynold's number for the moving layer, which includes the stationary layer as special case, agreed satisfactorily with experimental results. An application in practice therefore seems to be feasible.

38418

APTIC NO. 61429

Mori, Kenji, Kei Utsunomiya, Kazuya Soga, Katsunori Shimasaki, Yutaka Mito, and Mamoru Aoki

REDUCTION OF NITROGEN OXIDE BY METAL CATALYST (4): NO-CO-H₂O GROUP. (Kinzoku shokubai ni yoru sanku chisso no kangen (4)). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 699, 1974. (Presented at the Japan Chemical Society Spring Meeting, 30th, Higashi Osaka, Japan, April 1-4, 1974, Paper 1G03.)

A sample gas containing 0.54% of nitric oxide, 2.2% of carbon monoxide, 8.6% of water, and 88.66% of helium was reduced by nickel-copper-iron (50-20-30), nickel-copper-chromium (50-20-30), and nickel-copper-cobalt (50-20-30) catalysts which were treated previously at 1000 C for 5 min. The resulting gas was analyzed, NO, CO, hydrogen and nitrogen by gas chromatography, and ammonia by neutralization-titration. The temperature of the catalyst layer was raised gradually from room

temperature to 800 C and the resulting gas was sampled at given intervals. The formation of NH_3 increased as NO decreased and H_2 appeared when all of the NO was reduced. Fifty percent of the NO was converted at 490 C by Ni-Cu-Co and at 555 C by Ni-Cu-Fe and Ni-Cu-Cr. The existence of H_2O increased the catalytic activity of the former catalyst but decreased that of the two latter catalysts.

38419

APTIC NO. 61601

Osa, Tetsuo, Yasukazu Okatsu, and Yoshinobu Sakakibara

LOW TEMPERATURE OXIDATION OF CARBON MONOXIDE. (Issanka tanso no teion sanku). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 677, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G22.)

For low temperature oxidation of carbon monoxide, hopcalite (copper-manganese group) and precious metal catalysts are known to be effective, but the reaction mechanism and deterioration mechanism is not known. By observing the CO oxidation process, the deterioration mechanism of catalysts were examined. The Cu-Mn-zeolite and platinum-activated carbon were used as catalysts, and gas chromatography was used for analysis. Adsorption quantities were greatest in the order of carbon dioxide, carbon monoxide, and oxygen. Hopcalite group catalysts lost activity due to the reaction of CO_2 formed by reaction between CO and O_2 with manganese dioxide and copper oxide, which consumed lattice oxygen. The loss of Pt-activated carbon catalysts activity seems to be caused by oxidizing the Pt and by reaction of platinum oxide to CO_2 .

38420

APTIC NO. 61559

Osuga, Naoki and Susumu Okazaki

CATALYTIC HYDROREDUCTION OF NITROUS OXIDE. (Asanka chisso no sesshoku suiso kangen). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 284, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 2C39.)

The relationship between the reaction temperature and catalytic activity for hydroreduction of nitrous oxide in the presence of titanium catalysts was examined. The activities of molybdenum titanium, nickel titanium, and iron titanium catalysts, and the effects of the pretreatment temperature of titanium oxide in the Mo-Ti catalyst, the effects of hydroreduction temperature, and the effects of the quantity of added molybdenum oxide were investigated. The reaction gas was prepared by 1 portion of N_2O and 9 portions of hydrogen. The fixed gas flow reaction system and gas chromatography were used. The decomposition rate of N_2O by single catalysts at 600 C were: Mo-Ti, 14%, Ni-Ti, 30%, and Fe-Ti, 65%. When the temperature was changed to 250, 350, and 450 C, Mo-Ti catalyst showed an extremely low activity. The maximum activity was obtained when Mo-Ti catalyst was prepared by mixing titanium oxide plus 1 wt% of molybdenum and baking at 400 C. With a temperature of 250 C, catalytic activity of Mo-Ti catalyst began to decrease when the molybdenum oxide ratio was 0.8 wt% and decreased more as the amount was increased. At 20 wt%, activity almost disappeared. Yet, when the amount of molybdenum oxide was less than 0.8 wt%, high activity was obtained. Activity was very high even when molybdenum oxide was 0.05 wt%.

38421

APTIC NO. 61430

Takayasu, Masami, Hiromi Tomono, Yoshiaki Annen, Yuji Kawaguchi, and Yoshiro Morita

CATALYTIC REMOVAL OF NO (NO. 3): THE EFFECTS OF O_2 ON NO- H_2 REACTION ON COPPER CATALYST. (NO no sesshoku jokyo (3) doshokubaijo no NO- H_2 hano ni taisuru O_2 no eikyo). Text in Japanese. Preprint, Japan Chemical Society Tokyo, p. 665, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G01.)

A sample gas containing 1000 ppm of nitric oxide, 2 vol% of hydrogen, and 1 vol% of oxygen was used for reduction studies on three catalysts, and the resulting gases were analyzed by chemiluminescence, and gas chromatography. Catalysts A and B were prepared with coprecipitations of cupric nitrate and aluminum nitrate in sodium hydroxide and ammonium hydroxide solutions, respectively, at pH 8. The Cu:Al atomic ratio of the two catalysts was 1:4. Catalyst C was commercial platinum alumina. The catalysts were treated previously at 550 C for 3 hr in the atmospheric air followed by 2 hr in H_2 at the same temperature. The NO conversion and ammonia formation decreased on catalyst A due to the existence of O_2 . The NO conversion on catalyst B remained at 100% at the same condition, but the NH_3 formation decreased. No noticeable O_2 effect was found when the catalyst was used. X-ray diffraction studies revealed that possibly the reduced Cu atoms were responsible for the reaction.

38422

APTIC NO. 61450

Takeoka, So, Shigeru Nozawa, and Masataka Shimizu

PLATE CATALYSTS WITH ACTIVATED COATING FILMS - NO REDUCTION BY CO OXIDATION. (Kasei himaku o yusuru puretojo shokubai - CO sanku hano to NO kangen hano o rei to shite). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 282, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 2C37.)

To improve the pressure loss of porous catalysts, a plate type catalyst was prepared using an alloy with a thin surface coating, and reduction of nitric oxide was attempted with carbon monoxide. A metal mesh was soaked in 30-60% of copper, 1.5-4.5% of chromium, and aluminum at 850-900 C. The alloy closed the net openings and created an alloy plate. For development, it was soaked in 20-30% caustic soda solution at 80-100 C, for 1-60 min. An aluminum crystal system was developed over the surface of the plate at a thickness of 30-50 micron. The crystals were slowly oxidized. Carbon monoxide oxidation and NO reduction by CO were tried. In both cases, with the increase of development time, activity increased up to 5 min, then stayed at that level. When development time was 5-10 min, activity was about twice as great as a commercial catalyst for exhaust gas. When the Cu portion was 50%, a 60 min development resulted in about half of the activity obtained by 30-40% of Cu. In this product the mechanical strength of the coating was extremely good. In both reactions activation energy was low, about 3-6 cal/g-mol.

38423

APTIC NO. 61168

Tezuka, Yoshisato, Kikuo Oda, and Muneharu Matsumoto

REDUCTION OF NITROGEN OXIDES BY HYDROGEN ON SILVER CATALYSTS. (Gin shokubaijo de no sanku chisso no suiso ni yoru kangen hano). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 283, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 2C38.)

The mechanism of nitric oxide reduction by hydrogen on silver catalysts was studied by measuring the reaction speed time changes, the amount of adsorbed material, and Arrhenius plots. The measurement device was a normal closed circulation system with dry ice-alcohol traps before and after the reactor. The reaction speed was measured between 150-250 C, and the total pressure time change was followed by a mercury manometer. The formation time change was measured by gas chromatography. The formation speed of nitrogen was large in the initial stage and then drastically decreased. Nitrous oxide formation reached the maximum 15 min after the experiment was started. The quantity of adsorbed material was small in the area with high N_2 formation, but in the area with low N_2 formation, adsorption increased. The ratio of the catalyst surface coverage was 0.7 in the area of low N_2 formation, and grew to more than 1. The reduction speed of NO by H on a silver catalyst was very much influenced by the amount of adsorbed material.

38424

APTIC NO. 61265

Todo, Takayuki, Minoru Kurita, Hiroyuki Hagiwara, Akifumi Ueno, and Toshio Sato

REDUCTION OF NITRIC OXIDE BY AMMONIA ON VARIOUS OXIDE CATALYSTS. (THE EFFECTS OF OXYGEN). (Sushu no sankabutsu shokubaijo ni okeru ammonia ni yoru NO no kangen (Sanso no eikyo ni tsuite)). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 285, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 2C40.)

The effects of oxygen on nitric oxide reduction by ammonia were studied using a vanadium oxide (V2O5) catalyst. Five cc of gamma-alumina-permeated and crushed catalyst was used. Nitric oxide and nitrogen dioxide were measured by the chemiluminescence analyzer. Nitrous oxide was first condensed and measured by infrared spectrophotometry. Up to 350 ppm of NO, up to 350 ppm of NH3, 3.15% of O2, and N2 as a balance gas were passed over a 10% V2O5 catalyst. At 300 C, approximately 99% or more of NO was eliminated. When O2 was stopped in the middle of the reaction, the conversion rate was drastically reduced to 20% and when O2 gas was resumed again, the conversion rate recovered. This was true with gases containing sulfur dioxide or water. The O2 dependency of conversion rate was studied. Up to 0.3% concentration of O2, the catalytic activity rapidly increased, but after that, there was no great change. It seemed that gaseous O2 and also the lattice oxygen of V2O5 contributed to the NO reduction reaction, and the mechanism seemed to consist of low and high temperature types.

38425

APTIC NO. 61101

Tsykalo, A. L. and L. Y. Brener

INFLUENCE OF THE NONADDITIVE INTERMOLECULAR FORCES OF INTERACTION ON THE COAGULATION RATE IN AEROSOL SYSTEMS. (Vliyaniya neadditivnykh mezhmolekulyarnykh sil vzaimodeystviya na skorost koagulyatsii v aerolozhnykh sistemakh). Text in Russian. Kolloidn. Zh., 34(1):191-193, 1974. 7 refs.

Relations for the determination of the coagulation rate constants, taking into the non-additive intermolecular forces of interaction in aerosol systems, were computed on the basis of the results obtained by Renne and Nijboer. Significant change of the coagulation rates in terms of reduced attraction due to the non-additive effect was determined.

38426

APTIC NO. 61185

Wickert, K.

OXIDES OF NITROGEN IN FIRING SYSTEMS. (Stickoxide in Feuerungen). Text in German. VGB Kraftwerkstechnik, 54(1):60-66, Jan. 1974. 9 refs.

The formation of nitrogen oxides from nitrogen and oxygen at high temperatures and the methods for their measurement are discussed. The temperature, residence time, content of O2, and content of ammonia all influenced the nitric oxide concentration in the waste gas. Studies were also made of the binding of NO to a number of substances.

1973

38427

APTIC NO. 61245

Akimoto, Hajime

SELECTED RATE CONSTANTS OF CHEMICAL REACTIONS OF INTEREST IN PHOTOCHEMICAL AIR POLLUTION. (Kokagaku taikiosen ni kanyosuru kagaku hanna no sokudo teisu no hyoka). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(4):680-672, Dec. 1973. 139 refs.

A review of the reaction rate constants of interest for establishing reaction models of photochemical air pollution is given. Specially reviewed for evaluation are the rate constants

for termolecular reactions involving oxygen and hydrogen atoms, the rate constants for other inorganic reactions, the rate constants for oxygen atom-organic reactions, the rate constants of ozone-organic reactions, the rate constants of hydroxide radical-organic reactions, the rate constants of reactions of alkyl and alkylperoxy radicals, the rate constants of reactions of alkoxy radical, and the rate constants of reactions of acyl and peroxy radicals. Mechanisms of their chemical reactions are fully described. These rate constants are tabulated to indicate the reaction formulas.

38428

APTIC NO. 60708

Bukhman, S. V. and Y. Nurekenov

CALCULATION OF THE RATE AND TIME OF COMBUSTION OF COAL-DUST PARTICLES IN TAKING STEFAN'S FLOW AND ANISOTHERMALITY INTO ACCOUNT. (I raschetu skorosti i vremeni sgoraniya pyleugol'nykh chastits s uchetom stefanovskogo potoka i neizotermichnosti). Text in Russian. Teploenergetika, no. 1:40-42, 1973. 9 refs.

Calculation of the rate and duration of combustion of coal-dust particles is presented in a study of the joint action of Stefan's flow and anisothermality on the combustion of coal particles. The oxidation reaction leading to carbon monoxide, and further oxidation to carbon dioxide results in an increase in the gas volume, which gives rise to Stefan's flow from the particle surface, a flow which reduces oxygen diffusion toward the particle. The combustion of coal-dust particles occurs under highly anisothermal conditions in the boundary layer of the particles. For the calculations, absence of convective transfer was assumed. Formulas for the calculation of the diffusion with regard to Stefan's flow, of the mass exchange under anisothermal conditions, of the effect of Stefan's flow on the combustion, and of the duration of combustion are given. Good agreement between calculated and experimental data was established.

38429

APTIC NO. 61233

Ebitani, A., H. Niiyama, and E. Echigoya

REDUCTION OF NO AND H2 OVER METAL OXIDE CATALYSTS. (Kinzoku sankabutsu shokubai jo deno isankachisso to suiso no hanna). Text in Japanese. Preprint, Chemical Society of Japan, Tokyo, p. 138-139, 1973. (Presented at the Symposium on Catalysis, 33rd, Hiroshima, Japan, Oct. 10-11, 1973.)

Gamma alumina-supported metal oxide catalysts were used to investigate reduction of nitric oxide by hydrogen. Platinum, palladium, copper, and nickel catalysts were very active and yielded ammonia while iron, cobalt and chromium were not as active as the former group of catalysts but did not yield NH3. The reaction is consecutive from NO via nitrogen dioxide to nitrogen for the latter group of catalysts. The NO reaction over a reduced Fe catalyst, the effect of the carrier gas (helium or H2), and an examination of the rate equation suggests that over an Fe catalyst, the reaction proceeds through oxidation and reduction. The effect of the oxidation state of the catalyst on the reaction rate has also supported the redox mechanism and suggested the importance of a reaction step postulated in calculation of rate equation, in which an oxidation catalyst is reduced by H2 to produce water and a reduction catalyst. The amounts of NO chemisorption on various catalysts were proportional to the catalytic activity of the catalysts. Over a Ni catalyst, NH3 was not produced via NO2 but directly from NO.

38430

APTIC NO. 60769

Edwards, D. K. and A. Balakrishnan

THERMAL RADIATION BY COMBUSTION GASES. Int. J. Heat Mass Transfer, vol. 16:25-40, 1973. 40 refs.

Generalized expressions for the calculation of the emissivity, absorptivity, and other relevant radiation properties of molecu-

lar gases are given; and new rational correlations for the properties of water vapor, carbon dioxide, carbon monoxide, nitric oxide, sulfur dioxide, and methane are applied to combustion gas radiation problems. Modified band absorption parameters are useful in the approximate spectral calculation for either homogeneous or inhomogeneous gas mixtures, and comparisons with existing data for mixtures show good agreement. A band calculation for the gas mixture $H_2O-CO_2-CO-CH_4-SO_2-NO-N_2$ is presented, and such band calculations may be readily carried out for homogeneous gas mixtures. A simple computer routine for high-speed computation is also described. Tabular and graphical aids having the engineer physical insight into the radiation heat-transfer characteristics of the gases considered are also presented and described. (Author abstract modified)

38431

APTIC NO. 54222

Foster, P., J. Beason, and A. Cornu

DEVELOPMENT OF AN APPARATUS FOR THE SIMULATION OF ATMOSPHERIC PROCESSES. STUDY OF THE INTERACTION OF DIVERSE AIR POLLUTANTS DURING IRRADIATION. (Realisation d'un appareillage de simulation atmosphérique. Etude de l'interaction sous irradiation de divers polluants atmosphériques). Text in French. *Analisis*, 2(8):605-607, Sept. 1973. 5 refs.

A reaction chamber for the simulation of chemical reactions between interacting air pollutants, especially of chlorine with benzene and certain alkylbenzenes, and preliminary results of experiments with chlorine, benzene, toluene, and paraxylene are described. The reaction chamber constitutes a temperature-controlled, 200-liter recipient with a magnetic stirrer, in which microquantities of the gases to be investigated are admitted in pure air. Samples are taken during or after a certain amount of ultraviolet radiation. Formation of monochlorobenzene and of hydrogen chloride following ultraviolet irradiation for 10 hr of a gaseous mixture containing 25 ppm chlorine and 100 ppm benzene was determined by combined chromatographic and mass spectrometric method. Following 4-hour irradiation of a mixture containing 50 ppm toluene, 50 ppm paraxylene, and 35 ppm chlorine at 25-29°C, benzaldehyde, toluene, phenol, and cresol were detected. When the irradiation duration was increased to 8 hr, the reaction products were composed of hydrogen chloride, benzene, benzaldehyde, phenol, 2-chlorophenol, monochlorotoluene and/or benzyl chloride, chlorocresol, cresol, toluene, monochloroxylene, and possibly terephthalic anhydride and formyl-4-benzoic acid. Chlorine provoked photochemical oxidation of the benzene derivatives studied.

38432

APTIC NO. 58763

Huie, R. E. and J. T. Herron

THE COMBINATION REACTION OF NO AND O. In: Chemical Kinetics Data Survey VI. Photochemical and Rate Data for Twelve Gas Phase Reactions of Interest for Atmospheric Chemistry. National Bureau of Standards, Washington, D. C., Physical Chemistry Div., NBSIR 73-207, p. 35-58, Aug. 1973. 8 refs.

The chemical kinetics of the combination reaction of nitric oxide and oxygen were determined. The rate measurements on this reaction were compiled and reviewed. The major investigations of the temperature dependence of the reaction were performed using discharge flow systems over the range 212-293 K and over the range 300-505 K. The third body effect was studied extensively at room temperature also using a discharge flow system.

38433

APTIC NO. 66414

Ichimura, T., H. Akimoto, and H. Yamazaki

COMPUTER SIMULATION OF PHOTO-OXIDATION REACTIONS IN OLEFIN-NOX SYSTEMS. (Kokagaku taiki osen no keisanki shimyu reashon-orefin NOx kei). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan. Soc. Air

Pollution), 8(3):566, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 289.)

Forty-five elementary reactions were considered for the computer simulation of ethylene-nitrogen oxides system, with 20 molecules and 17 radicals. The studies were aimed at giving the best model for chemical reaction of the static system, which does not include diffusion, through the practical use of chemical kinetics. The computation was simulated to a smoke chamber experiment at C_2H_4 initial concentration of 1.7 ppm and NO_x initial concentration of 0.5 ppm. Conventional rate constants for each elementary reaction were varied within its standard deviation. Results showed that the calculated and experimental values of nitric oxide, nitrogen dioxide, oxidant, and formaldehyde were very consistent. The computation was carried out for propylene- NO_x system with 25 molecules and 22 radicals. The results were excellent.

38434

APTIC NO. 61329

Inouye, R. and Y. Watanabe

STATISTICAL PROPERTIES OF SULFUR OXIDES CONCENTRATIONS AT CONTINUOUS MONITORING STATIONS IN JAPAN. (Jido sokuteiki ni yoru io anakabutsu nodo sokuteichi no tokeiteki seishitsu ni tsuite (1)). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan. Soc. Air Pollution), 8(4):672-679, Dec. 1973. 5 refs.

The statistical properties of sulfur oxides concentrations at continuous monitoring stations in Japan were determined. The frequency distribution of SO_x concentrations measured at a fixed point continuously show that they commonly follow an approximate log normal distribution. The annual geometric mean of 1 hr average time C subscript g can be computed from an annual arithmetic mean C and 99th percentile value for the year C subscript 99th. A linear statistical relation of C subscript g with the average value of C. Similar relations were found between average value of C and a virtual geometric mean C subscript gm computed from the average value of C and the annual maximum value C subscript m and also between the average value of C and the annual geometric mean of 1-day averaging time C subscript gd, computed from the average value of C and the annual maximum value for 1-day average C subscript dm. From these linear regression equations, predicted values of C subscript 99th, C subscript m, and C subscript dm were calculated. These predicted values are correlated fairly well with the observed values at 177 selected continuous monitoring stations in Japan.

38435

APTIC NO. 58830

Ogasawara, M., T. Takagi, M. Daigura, and T. Yoshimoto

FORMATION OF NO IN TURBULENT DIFFUSION FLAME - IN CASE OF HYDROGEN FLAME. (Ranryu gas kakusan kaen niokeru NO seisei nitsuite. Suiso kaen no baai). Text in Japanese. Preprint, Combustion Inst., (Japan), p. 115-118, 1973. 2 refs. (Presented at the Symposium on Combustion, 11th, Tokyo, Japan, Dec. 6-7, 1973, Paper 32.)

The concentration distribution of nitric oxide, hydrogen, ozone, and nitrogen, plus the temperature distribution, were measured in H_2 diffusion flame. The effect of atomic oxygen on the formation of NO was discussed using a one-dimensional mixture model. In the formation of NO from N_2 and O₂ in air, the reaction of N_2 and atomic oxygen with atomic nitrogen is a rate-determining step. Since the concentration of N_2 was 50-80 mol% near the flame surface where the NO is formed and did not vary much, the concentration of atomic O largely influenced NO formation. Assuming that air is gradually mixed into a fuel gas containing H_2 , the concentration of hydroxides, NO, O₂, O, hydrogen, and H_2 and temperature were calculated as a function of time. Atomic O considerably affects NO formation when O₂ is mixed with a large concentration of H_2 .

38436

APTIC NO. 58516

Ohashi, Tomonori, Takeo Yamamoto, Kaoru Nishida, Kozi Hiramatsu, and Yutaka Itakura

THE EXPERIMENT OF TURBULENT DIFFUSION IN THERMAL STRATIFIED WIND TUNNEL. (Ondo seisō o yusuru baai no ranryū kakusan ni kansuru fudo jikken). Text in Japanese. Taiki Osen Kenkyū (J. Japan. Soc. Air Pollution), 8(3):388, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 127.)

Simulating the atmospheric contact with the earth terrain, a turbulent interface was successfully created in a wind tunnel with thermal stratified layers. Using a thermal line anemometer, the measurements of turbulence were taken and the vertical structure of the atmosphere in a thermal stratified layer was recreated. A heater was set in front of a wind tunnel of 1 m times 1 m times 6 m, and the temperature conditions were varied. The wind velocity was kept constant and turbulence was created by a rough-surfaced board. The thermal line anemometer output pressures were recorded in the data recorder, discrete simultaneous sampling were taken by A-D converter. The mathematical formula is presented. The relationship between vertical thermal flux elements and stability index is presented in a graph. With the increase of stability, the thermal flux is decreased.

38437

APTIC NO. 60437

Poppe, Michael

HEAT AND SUBSTANCE TRANSFER DURING EVAPORATION COOLING BY COUNTER AND CROSS-FLOW. (Waerme- und Stoffuebertragung bei der Verdunstungskuehlung im Gegen- und Kreuzstrom). Text in German. VDI (Ver. Deut. Ingr.) Forschungsh. (Duesseldorf), no. 560:1-44, 1973. 59 refs.

To calculate the evaporation cooling of a system, differential equations were derived from mass and energy balances containing only assumptions which are practically always valid. Through introduction of Merkel's approximations, this system can be easily reduced to Merkel's main equation. Examples show that Merkel's simplifications lead to mistakes in all cases in which equilibrium is almost reached within the system. With the new, more complete set of equations, the evaporating water mass can be exactly determined as well as the condition of the air upon leaving (temperature, water concentration). The new set of equations is now valid only for unsaturated air. If the air passes the saturation point and becomes fog the equations must be expanded to take into account the influence of condensation. A comparison of the results obtained using equations with measurements in a wetted-wall column and with measurements reported in the literature shows good agreement. Equations for the calculation of cross-flow cooling systems were also derived. A system of partial differential equations of the first order was obtained describing the changes in the conditions of the air and water in the installations. Good agreement with measured results were obtained.

38438

APTIC NO. 60721

Rouse, Robert A.

THEORETICAL CONFORMATIONAL ANALYSIS OF SATURATED HETEROCYCLES WITH ADJACENT HETEROATOMS. PRIMARY AND FINAL OZONIDES. J. Am. Chem. Soc., 95(11):3460-3467, May 30, 1973. 30 refs.

All 12 conformers of the cis- and trans-2-butene ozonide, a 1,2,3-trioxolane, were investigated using two semi-empirical methods, the extended Huckel theory (EHT) and the CNDO/2 method. The two methods, both all valence electron approximations to the localized atomic orbital-molecular orbital method developed by Roothaan and Hall, yielded different results for the relative stability and geometry of the conformers, and the results indicated that an appraisal of the two

methods for use in heterocyclic conformational analysis was necessary. Recently available microwave data for ethylene (final) ozonide conformers of ethylene ozonide clearly showed that the CNDO/2 method was appropriate for heterocycles with adjacent heteroatoms while the EHT method was not. Pertinent conformers of the cis- and trans-2-butene primary ozonides were restudied using a second, more appropriate geometry, and the conclusions reached indicated that a possible mechanism for the ozonolysis of olefins which depends on the conformation of the primary ozonide requires further analysis. (Author abstract modified)

38439

APTIC NO. 56546

Suzuki, Shin, Wataru Ando, and Nobutoshi Horiuchi

THE PHOTOCHEMICAL REACTION OF A SULPHUR DIOXIDE-HYDROCARBON- OXYGEN SYSTEM. Proc. Int. Clean Air Congr., 3rd, Duesseldorf, West Germany, 1973, p. C110-C112. 2 refs.

Studies were performed on the photochemical isomerization of cis-butene-2 and trans-butene-2 in the presence of sulfur dioxide and on the effect of oxygen on the photochemical isomerization of cis-butene-2 to trans-butene-2. Percentage of isomerization was much greater in the sulfur dioxide-cis-butene-2 system than in the SO₂-trans system during the same radiation time interval which seems to indicate that photochemical isomerization from cis- to trans-butene-2 is much easier than the reverse. The isomerization percentage of cis-butene-2 in the SO₂-cis-butene-2-O₂ system proved to be lower than in a SO₂-cis-butene-2-nitrogen system which seems to suggest that the SO₂ photosensitized isomerization of cis-butene-2 is retarded by O₂. Isomerization percentage for both systems increased initially with the SO₂ concentration, reaching a maximum value at 1% SO₂ and thereafter decreasing. Acetaldehyde was detected by gas chromatography in the photochemical gas phase reaction of the SO₂-cis-butene-2-O₂ system; the aldehyde formation may have been due to the reaction of cis-butene-2 with singlet oxygen.

38440

APTIC NO. 60904

Tsai, Shih-Yi

THEORETICAL ANALYSIS OF AGGLOMERATION OF AEROSOLS IN ACOUSTIC FIELDS. Northeastern Univ., Boston, Mass., Dept. of Mechanical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 73-28,842, June 1973, 112p. 34 refs.

The motion of suspended particles and their agglomeration in a fluid subjected to a low frequency space and time dependent oscillatory motion was theoretically investigated. The suspended particles were assumed to be spherical but not of uniform size, to experience only inertia collisions, and to form a new spherical particle upon collisions of two existing particles. The frequency of collision per unit volume between particles of two different sizes was assumed equal to the product of their local velocity difference, the combined interception area, and the local concentrations of these two different size particles. Particles of different sizes oscillate in the alternating velocity field with different amplitudes and phase lags. Particle oscillation and agglomeration were studied in a spatially uniform oscillating fluid. Oscillation-induced agglomeration of particles in a space and time dependent oscillating fluid and oscillation-induced agglomeration of mixtures of particles of different sizes were also analyzed. An equation was derived describing the migratory variation of particle number density as a function of time and position. For the case of an aerosol containing only fine particles of single size and much larger collecting particles of some other size, an analytical expression for the collection efficiency of fine particles as a function of time and position was derived. For the case of a suspension containing particles of nonuniform size, the agglomeration among the particles results in sink and source terms in a phase conservation equation of mass particles of each size. The source and sink terms consistent with the inertia collection

model were derived. Equations describing the number density of the particles of each size were numerically solved. Progress of agglomeration of systems of several different initial size-distributions were calculated for various alternating velocity field parameters. Particle removal by means of agglomeration characterizes devices such as spray chambers and venturi scrubbers. (Author abstract modified)

38441

APTIC NO. 61342

Tsujino, Y.

CONTINUOUS DETERMINATION OF NITROGEN OXIDES CONCENTRATION IN AMBIENT AIR (II): A PROCEDURE FOR OXIDIZING NO IN LOW CONCENTRATIONS TO NO₂. Osaka-fu Kogai Kanshi Senta Chosashitsu Kenkyu Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center), p. 41-46, Dec. 1973. 6 refs.

A solid chemical oxidant was evaluated for oxidizing nitric oxide at lower concentration to nitrogen dioxide in a continuous process appropriate to the analytical requirement. The oxidant is prepared by saturating glass fiber paper with a solution of sodium dichromate and sulfuric acid and then drying. Sheets of the paper are sandwiched between two glass cups through which the gas sample is passed. Because the glass holder-solid oxidizer forces nitric oxide to permeate through the dichromate papers in a moment, the oxidizer has no effect on the nitrogen dioxide present in the sample and oxidizes the nitric oxide to nitrogen dioxide. The oxidation efficiency was 98% for 1 sheet, 100% for 2-4 sheets, and less than 86% for 6 sheets at 25% relative humidity and 100 cc/min sample flow rate. Apparently the six sheets partially absorb and/or overoxidize NO. Absolute measurements of NO concentrations were estimated to be correct to + or - 4% with the present procedures.

38442

APTIC NO. 61218

Vydrova, Milena and Jiri Tuma

BULK PROPERTIES OF POWDERS. (Sypne vlastnosti prachu). Text in Czech. Zdravot. Tech. Vzduchotech., 16(6):297-302, 1973. 2 ref.

Bulk and packed densities and the angles of slope and sliding of powders, especially of fly-ash, are discussed. Methods and instruments are described. The ratio of the packed density:bulk density is usually between 1.2:1 and 1.5:1, depending on the particle size. The angle of sliding depends mainly on the friction between the particles and the surface of the support base, and on the particle size. These data are useful guides for the choice of dust separators, and for planning disposal and dumping of waste material.

38443

APTIC NO. 56867

Yates, W. E., J. Stephenson, K. Lee, and N. B. Akesson

DISPERSAL OF GRANULAR MATERIALS FROM AGRICULTURAL AIRCRAFT. Trans. ASAE (Am. Soc. Agr. Engrs.), 16(4):609-614, July-Aug. 1973. 7 refs.

A systematic approach to the development of an improved distribution mechanism for agricultural aircraft is discussed. A Fortran LV digital computer program was developed, and an IBM 7044 computer was used to evaluate a series of trajectory data for a variety of initial conditions. Theoretical values of spread were tabulated for a wide range of ejection angles, aircraft speeds, ejection velocities, particle sizes, and altitudes. Experimental results verify that the theoretical model can be a valuable aid in the design of an aircraft distributor. Trajectory data provide information on the theoretical kinetic energy or input horsepower required for a given lateral spread. Thus, the theoretical power required for a given spread provides a sound basis for evaluating the overall efficiency of any distributor from the distribution pattern, particle size, and power input measurements. A new concept—a dual rotary paddle distributor—was designed, constructed, and tested. The unit offers a

minimum power requirement for use at high mass flow rates of large granulated fertilizers. Initial tests indicate an effective swath width of 58 ft, with an average application rate of 300 lb per acre, and less than 10 bhp required for the hydraulic-drive system. (Author summary modified)

38444

APTIC NO. 60631

Dutch Aerosol Working Group

SURVEY OVER AEROSOL STUDIES IN THE NETHERLANDS. (Overzicht van activiteiten in Nederland op het gebied van aerosolen). Text in Dutch. Het Reactor Centrum Nederland, Het Interuniversitair Reactor Instituut, and Het Chemisch Laboratorium TNO, 38p., Sept. 1973.

The activities of various research institutes, clinics, and universities in the Netherlands in aerosol research are surveyed. The research activities are coordinated by the Dutch Aerosol Working Group. The physicochemical properties of atmospheric and workplace aerosols, the detection and toxicity of submicroscopic asbestos fibers, the kinetics of thermophoresis and diffusophoresis, the inactivation of microorganisms and biological molecules in aerosols, the use of in-line holography for aerosol particle size measurement, the identification of small quartz particles by interference microscopy, the clinical and clinical experimental use of aerosols, and the effects of allergenic aerosols are among the principal research projects. Apparatus for the atomization of disinfectants, paints, and plant protecting agents have been developed.

38445

APTIC NO. 61096

Krasnogorskyaya, N. V. and A. I. Neizvestnyy

EXPERIMENTAL INVESTIGATIONS ON COALESCENCE OF CHARGED AND NEUTRAL DROPLETS OF COMPARABLE SIZE. (Eksperimentalnye issledovaniya koagulyatsii zaryazhennykh i neytralnykh kapel sravnimyykh razmerov). Text in Russian. Meteorol. i Gidrol., no. 12:43-52, 1973. 22 refs.

The collision efficiencies of charged and neutral cloud droplets with radii of 6 to 30 micron and charges 0.00000001 to 0.00005 esu were studied in a laboratory under turbulence-free conditions, and the results obtained were compared with theoretical investigations. The collision coefficients obtained differed from zero in all cases, and were higher than those obtained by Hocking and Jonas. Calculations for the collision of charges with neutral droplets and for droplets with opposite charges gave results in good agreement with the experiments. In stratocumuli, opposite charges equalling the mean value of the measured charges, do not affect the rate of coalescence, while opposite charges corresponding to the maximum strongly increase the rate of coalescence. The existence of a charge range in which the collision efficiency is practically independent of the magnitude of the charge is due to the equal probability of collisions between droplets with charges of the same and opposite signs.

1972

38446

APTIC NO. 60590

Chu, N. C. and C. A. Depew

HEAT TRANSFER TO GAS-SOLIDS SUSPENSION FLOWS ON VERTICAL CIRCULAR TUBES. Proc. Heat Transfer Fluid Mech. Inst., Northridge, Calif., 1972, p. 371-385. 27 refs. (June 14-16.)

Heat transfer to flowing air-solids suspensions in a vertical cylindrical tube with uniform heat flux was studied analytically and experimentally with electrically heated tubes of 1 in. and 2 in. diameter. The range of Reynolds numbers was from 12,000 to 30,000, and glass particles of 30, 62, and 200 micron were used. Local wall temperatures were measured, and mixture bulk temperatures were determined by an energy balance. Heat transfer results were reported in terms of local Nusselt numbers based on the wall to bulk temperature difference. The

system was mathematically modeled as a continuum, and a finite difference technique was used to solve the equations. The analytical model pertained to the region where the flow was fully developed hydrodynamically and thermally and to moderate heating conditions such that the point-mean hydrodynamic properties from a previous study in a room temperature-isothermal tube could be applied. Suspension velocity profiles and particle distributions were known for 1/2, 3/4, and 1 in. tubes for a range of Reynolds numbers and solids loading ratios; and these properties were used to define the flow for the present studies. The eddy diffusivity for heat was treated as a parameter, and a parametric study was conducted to determine the values of the diffusivity ratio (EH/EM) which gave agreement with the experimental data. The eddy diffusivity ratio was found to be correlated with a straight line for each particle size on a logarithmic plot. (Author abstract modified)

38447

APTIC NO. 60815

Dryer, Frederick L.

HIGH TEMPERATURE OXIDATION OF CARBON MONOXIDE AND METHANE IN A TURBULENT FLOW REACTOR. Princeton Univ., Princeton, N. J., Dept. of Aerospace and Mechanical Sciences, Air Force Grant AFOSR-69-1649, Proj. 61102F, 681308, Rept. AFOSR-TR-72-1109, AMS Rept. T-1034, 318p., March 1972. 178 refs.

NTIS,DDC: AD 746284

The high temperature oxidation reactions of carbon monoxide and methane in oxygen-rich atmospheres have been studied in a turbulent flow reactor. Spatial chemical sampling and gas chromatographic analysis techniques were developed for these studies, and the experimental methods are directly extendable to investigations of higher hydrocarbon oxidations. Overall expressions were developed for the carbon monoxide and methane disappearance rates and for the appearance rate of carbon dioxide in the methane-oxygen reaction. These and other data were used to deduce the relative importance of several elementary reactions in the oxidation mechanisms. Other reactions in addition to hydroxyl attack on methane appeared important in governing the methane disappearance rate in oxygen-rich, high temperature systems; and the reactions of oxygen atoms with methane and methyl radicals with hydrogen were suggested to contribute significantly to the observed disappearance rate of methane. Thus, high temperature evaluations of the rate constant for hydroxyl attack on methane which have neglected these latter contributions are in error. A transition state description of the temperature dependence of the reaction of carbon monoxide with hydroxyl radicals suggests that this rate constant has been underestimated at high temperatures. (Author abstract modified)

38448

APTIC NO. 60940

Falgout, Dennis Allen

THE REACTIONS OF NITROGEN AND SULFUR OXIDES IN AIR. Florida Univ., Dept. of Environmental Sciences, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 73-29, 172, 1972, 143p. 52 refs.

The photochemical, dark, and light-induced dark reactions of sulfur dioxide and nitrogen dioxide in air were studied. The effects on the rate of SO₂ consumption, caused by various levels of water vapor, ethylene, and acetone and the amount of irradiation were observed. The reactions were carried out in 2-liter borosilicate glass flasks. Rigorous cleaning of the reaction vessels is required. The reactants and some products were analyzed by gas chromatography and infrared spectrophotometry. In the dark and in the presence of NO₂ and air, SO₂ was consumed at a rate of .05%/hr. This reaction is too slow to be an important mechanism of SO₂ removal from the atmosphere. The dark reaction rate is increased four to five times in the presence of 25-100% relative humidity. The

rate of photochemical reaction of SO₂ in the presence of NO₂ and air was 1.3%/hr. Either atomic oxygen is not involved in the oxidation of SO₂ or the nitric oxide also produced by the photolysis of NO₂ must be involved in the formation of the ultimate product. The rate of SO₂ photooxidation in the presence of NO₂-C₂H₂-air was 4.3%/hr and was independent of the ethylene concentration. The light-induced dark reaction which followed the cessation of irradiation consumed 5.5%/hr SO₂. During this reaction, no C₂H₄ was consumed and no evidence of consumption of any other gaseous species was found. The concentration of nitro-methane increased, suggesting that the solid reaction products of C₂H₄-NO₂ photolysis are involved in the consumption of SO₂ in the dark. Photocatalytic oxidation of SO₂ in the NO₂-acetone-air system was negligible, as was the rate of photooxidation of acetone. The light-induced dark consumption rate of SO₂ varied from 0.3-9%/hr and was a function of the acetone concentration. The induction period followed the termination of irradiation and preceded the period of relatively fast consumption of the reactants. (Author abstract modified)

38449

APTIC NO. 60658

Kochan, Robert J. and Vernon E. Denny

DOWNSTREAM EFFECTS OF DISCONTINUOUS INJECTION OF FOREIGN GASES. Heat Transfer and Fluid Mechanics Inst., Proc. Heat Transfer and Mech. Northridge, Calif., 1972, p. 73-88. 17 refs. (June 14-16.)

An analytical study of the downstream effects of discontinuous injection of foreign gases on laminar, compressible boundary layer flows was performed. The analysis pertained to zero pressure gradient flow over a flat plate, with the mass species being injected in self-similar fashion upstream of a semi-infinite impermeable wall. The non-similar downstream problem was solved by means of finite difference methods, and initial conditions for the numerical procedure were extracted from the similar solution which applied upstream. Numerical results for recovery of wall shear and conductive heat flux versus number of injection lengths were reported for air, xenon, and helium-into-air and were discussed in terms of the same problem parameters: blowing parameter, Mach number parameter, and wall-to-free stream total enthalpy ratio which ranged from 0.0 to minus 0.4, 0.0 to 0.9, and 0.1 to 0.9, respectively. Physical properties were approximated by means of kinetic theory, apart from the assumption of ideal gas behavior and constant species specific heats. (Author abstract modified)

38450

APTIC NO. 60974

Radchenko, I. S. and P. P. Safonenko

THE EFFECT OF THE SHAPE AND ORIENTATION OF ATMOSPHERIC DUST PARTICLES ON THE SPECTRAL PLACE AND THE FORM OF THE ATTENUATION BAND. (Vliyaniye formy i orientatsii pylevykh chastits v atmosfere na spektral'noye polozheniye i formu polosy oslableniya). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(12): 1322-1326, Dec. 1972. 4 refs.

The effect of the shape and orientation of atmospheric ellipsoidal iron particles on their attenuation coefficient was studied. In the case of chaotically-oriented ellipsoids of rotation in the absence of a vectorial field, the shape of the iron particles has little effect on the attenuation coefficient. In the case of ellipsoidal iron particles oriented by an external vectorial field with the electric vector of the plane-polarized light oscillating along the long axis of the ellipsoid, a gradual shift of the maximum attenuation coefficient towards the long-wave spectral range, and a strong increase in the attenuation in the red and near-infrared ranges were observed. In the case of ellipsoids of rotation, oriented in a vectorial field with the electric vector of the plane-polarized radiation parallel with the short axis of the ellipsoids, a shift of the maximum attenuation coefficient towards the short-wave spectral range, and a decrease of the attenuation over the entire spectral range with the elongation of the ellipsoids were determined.

38451

APTIC NO. 60821

Schneider, Wilhelm

RADIANT INTERCHANGE AMONG SUSPENDED PARTICLES AND ITS EFFECT ON THERMAL RELAXATION IN GAS-PARTICLE MIXTURES. Heat Transfer and Fluid Mechanics Inst., Stanford, Calif., Proc. Heat Transfer Fluid Mech. Inst., Northridge, Calif., 1972, p. 354-370. 16 refs. (June 14-16.)

A quantitative description of the radiant interchange among suspended particles and its effect on thermal relaxation in gas-particle mixtures has been formulated. Basic equations describing both the total radiative transfer and the radiant interchange among particles were developed, and respective radiative energy losses were taken into account in the energy balances for the mixture and particles. A linear integro-differential equation was obtained for small temperature disturbances from an equilibrium state, and the equation was solved analytically for the example of disturbances varying periodically with time and numerically for the relaxation process due to an initially constant temperature difference between particles and gas. The results were obtained for particle and gas temperature as functions of time and particle radius; and their dependence upon the radiation-conduction parameter and the dispersion parameter of the size-distribution function was considered. A series expansion which was valid for small times was performed to provide a better understanding of the relaxation process. (Author abstract modified)

38452

APTIC NO. 58753

Spurny, K. R. and J. P. Lodge, Jr.

THE GENERATION OF HIGH DISPERSED RADIOACTIVE LABELED AEROSOLS. Inst. Nat. Rech. Chim. Appl., Dixieme Colloq. Atmos. Polluees, Proc., Paris, France, 1972, 10p. 11 refs. (May 3-5.)

The preparation of inorganic highly dispersed aerosols by means of the condensation of supersaturated vapors is presented. The formation and properties of the following aerosols are described: silver, iron oxide, mercury, sodium chloride, platinum oxides, sulfur, selenium, vanadium pentoxide, and many others. The radioactive labeling of the vaporizing material was very useful. Its application in aerosol physics, aerosol chemistry, and filter testing is discussed. Preliminary experiments were carried out with a platinum tubular aerosol generator. (Author abstract modified)

38453

APTIC NO. 60665

Sternling, C. V. and J. O. L. Wendt

KINETIC MECHANISMS GOVERNING THE FATE OF CHEMICALLY BOUND SULFUR AND NITROGEN IN COMBUSTION. FINAL REPORT. Shell Development Co., Emeryville, Calif., Environmental Protection Agency Contract EHSD 71-45, Task 14, Program Element IAB013, ROAP 21ADE-10, Rept. EPA-650/2-74-017, 146p., Aug. 1972. 334 refs.

NTIS: PB 230895/AS

Results are presented from an investigation of the mechanisms by which nitrogen and sulfur which are chemically bound in fuel molecules are converted into objectionable pollutants. A literature survey and computer simulation for the integration of the material and heat balance equations for either pointwise conditions or for a plug flow reactor were the tools of analysis used. Problem areas examined included the role of pyrolysis, mathematical modeling of a turbulent diffusion flame, kinetic mechanisms of nitric oxide formation and reduction, kinetic mechanisms of the oxidation of sulfur dioxide to sulfur trioxide, and process modifications in combustion to reduce SO₃ emissions.

1971

38454

APTIC NO. 60855

Bricard, J., G. Madelaine, and D. Vigla

STUDY OF THE FORMATION OF PHOTOLYTIC AEROSOLS IN POLLUTED ATMOSPHERE. (FINAL REPORT). (Etude de la formation des aerosols d'origine photolytique dans des atmospheres polluees). Text in French. Laboratoire de Physique des Aerosols, Paris (France), Faculte des Sciences, D.G.R.S.T. Contract 69-01-753, AR. 1413, 16p., Dec. 1971. 6 refs.

The effect of small concentrations of oxygen, water vapor, sulfur dioxide, nitric oxide, and nitrogen dioxide on the photolytic formation of condensation nuclei (atmospheric aerosols) was studied in a stainless-steel reaction chamber under artificial light. Oxygen present in 1% concentration failed to produce aerosols in the presence of SO₂, and neither did water vapor in concentrations from 1 ppm to 40% relative humidity. Nitric oxide in concentrations of up to 4 ppm failed to produce aerosols from SO₂ in the presence of nitrogen. Formation of condensation nuclei from NO₂ was observed. With a maximum reached after 90 min irradiation, no influence of renewed irradiation on the nucleation was observed. The particle counts determined in experiments with 0.5 ppm and 2 ppm NO₂ were 6000 particles per cu cm and 150,000 particles per cu cm, respectively. The particle counts determined following a reaction of NO₂ with SO₂ were in the order of magnitude of several million particles per cu cm. The direct photochemical oxidation of SO₂ was found not to be possible, and the presence of an oxidant produced by other chemical reactions, such as NO₂, was found necessary. The rate of SO₂ transformation to particles was about 1% per hour.

38455

APTIC NO. 60667

Eichmeier, J.

PRODUCTION OF SMALL IONS, LARGE IONS AND CONDENSATION NUCLEI BY VARIOUS TECHNICAL PARTICLE SOURCES IN A CLOSED ROOM. (Die Erzeugung von Kleinionen, Grossionen und Kondensationskernen durch verschiedene technische Teilchenquellen in einem abgeschlossenen Raum). Text in German. Arch. Meteorol. Geophys. Bioklimatol., Ser. B, no. 19:69-86, 1971. 48 refs.

Measurements of the concentrations of small and large ions and condensation nuclei in a closed room indicated that such particle concentrations are capable of considerable change under the influence of different ion and neutral particle sources. An electrically charged beta-emitter or corona wire produced high densities of positive (or negative) small ions and large ions, while an ultraviolet lamp generated negative small ions, positive large ions, and condensation nuclei. A glowing wire increased the concentration of positive ions and condensation nuclei. Ignition of a candle and operation of a water sprayer caused an increase of all particle concentrations. Spraying of fresh air, cigarette smoking, or ignition of a combustion motor only increased the number of large ions and condensation nuclei.

38456

APTIC NO. 58321

Horie, Y. and L. T. Fan

SIMULATION STUDY OF HIGHWAY AIR POLLUTION. Environ. Letters, 2(2):89-99, 1971. 12 refs.

A mathematical model for simulating highway air pollution has been developed by considering the macroscopic material balance of the polluted air mass over a segment of a highway that passes through an urban area. Problems of traffic assignment to such a highway were studied by considering not only traffic performance but also air pollution over the highway. Both link service rates and link average concentrations increased with an increase in the sum of entering flows. Pollutant concentrations for links in the downtown area were

generally higher than for other links despite a lower link service rate. The highest link average concentration of carbon monoxide was lower than 8 mg/cu m for unstable meteorological conditions, whereas the highest link average concentration under neutral meteorological conditions was as high as 22.5 mg/cu m. Urban transportation planning of a city conducted solely by considering traffic conditions was found inadequate since the high link average concentration which accompanies the generally beneficial high link service rate was found detrimental.

38457

APTIC NO. 56449

Pitts, James N., Jr.

SOME FUNDAMENTAL ASPECTS OF PHOTOCHEMISTRY AND PHOTOCHEMICAL AIR POLLUTION. In: *Combustion-Generated Air Pollution. A Short Course on Combustion-Generated Air Pollution* held at the University of California, Berkeley, September 22-26, 1969. Ernest S. Starkman (ed.), New York-London, Plenum Press, 1971, p. 67-82. 11 refs.

Fundamental aspects of photochemistry and their applications to the problem of photochemical air pollution are presented. The photodecomposition of acetone, a contaminant of urban atmospheres, includes one free radical primary process and a series of secondary thermal reactions of the radicals produced in the absence of air. Acetone photolysis at elevated temperatures furnishes a clean source of methyl radicals. Aldehydes, which are a particularly important constituent of automobile exhaust, can undergo photolysis to give highly reactive radical species which lead to a variety of products, particularly in urban atmospheres in which nitric oxide and nitrogen dioxide are present. The important pollutant peroxyacetyl nitrate may be formed by one of these mechanisms. Among the oxides of nitrogen, only nitrogen dioxide is both present in significant amounts and also a strong absorber of sunlight, the energy source required for initiation of photochemical air pollution. It furthermore photodissociates to give highly reactive fragments (oxygen atoms) capable of initiating the thermal reactions responsible for the overt physiological manifestations of smog such as eye irritation and plant damage.

38458

APTIC NO. 60703

Platten, J. L. and J. F. Keffer

DEFLECTED TURBULENT JET FLOWS. *J. Appl. Mech.*, 38(4):756-766, Dec. 1971. 8 refs.

An axisymmetric turbulent jet discharging into a uniform crosswind was studied experimentally for a range of jet to free-stream velocity ratios. This can be applied to problems of dispersion of effluents from chimney stacks and V/STOL aircraft. The experiments were carried out in a low velocity wind tunnel with 1% turbulence intensity and uniform velocity field. Jet center-line trajectories, that is, loci of maximum velocity, were obtained for nominal velocity ratios of 4, 6, and 8 over a range of initial jet angles of + or - 45 deg at 15 deg intervals. The actual velocity ratios used were 4.05, 6.32, and 8.32. The tunnel velocity was 1.58 mps for all tests. At the jet exit, the ratios of maximum to average jet velocities for discharge angle equal to 0 deg were 1.22, 1.24, and 1.20 for the three velocity ratios, respectively. Although the results were self-consistent, they were not as close to previous work as expected, possibly due to differences in devices used to produce the jet and to nonuniformity of the initial velocity profile for the present case. The most marked result of increasing the velocity ratio was the less abrupt deflection of the trajectories upon entering the crossflow. The absolute jet penetration depended upon the initial momentum flux of the jet relative to the crosswind. There was no obvious self-similarity of the trajectories.

1970

38459

APTIC NO. 59187

Moeller, U. and G. Schumann

MECHANISMS OF TRANSPORT FROM THE ATMOSPHERE TO THE EARTH'S SURFACE. *J. Geophys. Res.*, 75(15):3013-3019, May 20, 1970. 18 refs.

Wind tunnel experiments have been made with wind speeds of 3 through 8 m/sec, and deposition on a water surface has been studied. The deposition velocity was measured for water vapor, carbon dioxide, atomic lead, purified water residual nuclei, sodium chloride aerosols, and polystyrene latex spheres. Radioactive tracers were used for detection. The studies covered diffusion coefficients (D) from nearly 10 to the minus 7th to 0.25 sq cm/sec, and all were carried out under the same conditions. The results are best fitted by a relation velocity is proportional to D to the 2/3 power in the range .02 is greater than or equal to D is greater than or equal to .00002 sq cm/sec and thus favor the concept of proportionality between the characteristic length in the turbulent boundary layer and the height above the surface. (Author abstract)

1969

38460

APTIC NO. 60666

Hisatsune, I. C. and Leo Zafonte

A KINETIC STUDY OF SOME THIRD-ORDER REACTIONS OF NITRIC OXIDE. *J. Phys. Chem.*, 73(9):2980-2989, Sept. 1969. 28 refs.

An investigation of the third-order reactions involving two moles of nitric oxide plus X sub 2 equals 2NOX, where X is oxygen, chlorine, or bromine, was conducted by following the time dependence of the strong NO stretch infrared absorption band of the product NOX. The third-order rate constants at 25 C expressed in units of 1/sq M times sec for O, Cl, and Br, respectively, were: 1.42 times 10,000, 19.7 times 1000, and 9.53 times 1000. The results were not able to distinguish whether the reaction mechanism involved a rapid pre-equilibrium of the NO dimer or ONX sub 2 or was termolecular. Competitive reactions of NO with O2 and Cl2, with O2 and Br2, and with Cl2 and Br2 were also investigated; and, except for the last mixture, the former reaction systems gave results which agreed with those obtained from single-component studies. Formation of NOCl occurred in two stages in the reaction of NO with Cl2 and Br2, and the rates for both stages were faster than that when Cl2 alone was present. A mechanism involving BrCl and NOBr was proposed to explain this case. (Author abstract modified)

38461

APTIC NO. 56354

McMillan, G. R., Jalaj Kumari, and D. L. Snyder

THE PHOTOLYSIS AND PHOTOOXIDATION OF ALKYL NITRITES. General Motors Research Labs., Warren, Mich., Chem. React. Urban Atmos., Proc. Symp., Warren, Mich., 1969, p. 35-44. 19 refs.

The present state of knowledge of the photochemistry of various C2 to C5 alkyl nitrites is reviewed. The discussion includes the primary photochemical dissociation, subsequent reactions of alkoxy radicals formed by the dissociation, the importance of vibrationally excited alkoxy radicals, and the suitability of nitrites as radical sources in air pollution studies. The principal primary dissociative process in photolysis of alkyl nitrites at 3660 A forms alkoxy radicals and nitric oxide, and the efficiency of the process is considerably less than unity for certain nitrites. Alkyl nitrites are preferred photochemical sources of alkoxy radicals because excited radical formation is relatively unimportant, at least at wavelengths of 3660 A and longer. Photolysis of tert-amyl nitrite at 2537 A forms excited tert-pentoxy radicals with a yield of unity even in the presence of NO or oxygen. Decomposition of these

excited radicals to ketones and alkyl radicals is complete, and this suggests that the system might be used as an alkyl radical source in certain laboratory experiments on oxidizing atmosphere. The use of nitrite photolysis for generation of alkoxy radicals in systems containing oxygen is open to question at the present state of understanding. (Author abstract modified)

1968

38462

APTIC NO. 60747

Eichmeier, J. and P. Herden

MOBILITY SPECTROGRAMS OF ARTIFICIALLY PRODUCED ATMOSPHERIC IONS IN THE SMALL AND MEDIUM ION RANGE. (Beweglichkeitsspektren kuenstlich erzeugter atmosphärischer Ionen im Klein- und Mittelsonenbereich). Text in German. *Z. Phys.*, 24(6):300-364, 1968. 43 refs.

Mobility spectrograms of artificially-produced atmospheric ions in the small and medium ion ranges, measured with an aspiration type mobility spectrometer with cylindrical condenser and single divided inner electrode and circular ion gap are presented. The system had a resolving power of 1.45, and a lower mobility limit of 0.003 sq cm/Vs. Polonium(210) isotope as alpha ray source, tritium as beta ray source, a gamma ray source, an x-ray tube, an ultraviolet lamp, corona wire, hot wire, gas flame, and water atomizer were used as ion sources. A comparison of the spectrograms obtained demonstrates the existence, apart from ion sources producing both negative and positive ions, of sources producing either only negative ions (UV lamp and electric arc), or only positive ions (hot wire). The distribution curves of the ion spectral concentrations were bell-shaped for all ion sources except for the water atomizer. The bell-shaped curves of the positive ions were usually both broader and higher than those of the negative ions in the case of ion sources producing both negative and positive ions. The mobility of the positive and negative ions was in the respective ranges of 0.14-1.35 sq cm/Vs and 0.29-2.08 sq cm/Vs. The ions produced by flame were composed mostly of ionized combustion products of the fuel. The natural atmospheric small ions may be identical with those produced by alpha and beta sources as well as by UV lamp, and possibly by x-ray and gamma source in the small ion range.

38463

APTIC NO. 60802

Eichmeier, J.

STUDY OF THE STRUCTURE OF ATMOSPHERIC SMALL IONS. (Beitrag zum Problem der Struktur der atmosphärischen Kleinionen). Text in German. *Z. Geophys.*, vol. 34:297-322, 1968. 36 refs.

The probable structure of small ions generated in air and different gas components of the air at atmospheric pressure is examined from three independent points of view. The first consists of a comparison of measured mobilities with the values calculated from the Langevin theory for elastic and polarization scattering under the assumption of close molecule packaging. The second point of view is concerned with the geometrically possible number of places of attachment in an ion which depends on the sign of ionic charge, while the third point of view considers the energy balance for a molecule belonging to the ion for a short time. The picture of small ion structure obtained from considering these three aspects is that of a relatively dense accumulation of molecules which attach to the positively or negatively ionized central molecule only for a short time and are continuously replaced by other molecules in impact processes. The number of molecules participating in these exchange processes at any moment is not more than about 12 for the positive and five for the negative ions. Small ions probably consist of a mixture of molecules in mixtures of gases, as for example in the atmospheric air; the composition is seen as being continuously altered by exchange processes.

166

The different polarizability, binding energy, and relative concentration of the gas components have an influence only upon the average time of attachment and therefore on the average number of molecules of one kind which belong to a small ion at any moment.

1967

38464

APTIC NO. 60698

DeGraff, B. A. and G. B. Kistiakowsky

PHOTOLYSIS OF KETENE IN THE PRESENCE OF CARBON MONOXIDE. *J. Phys. Chem.*, 71(12):3984-3993, Nov. 1967. 20 refs.

The reaction of photochemically generated singlet and triplet methylene with carbon monoxide to form ketene was studied at several wavelengths. Triplet methylene reacts more readily with CO than with CH₂CO or butene, whereas the reverse was true for singlet methylene. The ratio k_4/k_3 , where k_4 was the rate constant for the reaction 3CH₂ and CO to give CH₂CO and where k_3 was the rate constant for the reaction 3CH₂ and CH₂CO to give products, for triplet was 3.6 at 3160 Å and might have been somewhat wavelength dependent. The ratio k_2/k_1 , where k_2 was the rate constant for the reaction 1CH₂ and CO to give CH₂CO and where k_1 was the rate constant for the reaction of 1CH₂ and CH₂CO to give products, for the singlet was 0.14 plus or minus 0.02 over the wavelength region 2900-3340 Å. The ratio k_5/k_1 , where k_5 was the rate constant for the reaction 1CH₂ and M to give 3CH₂ and M, was approximately 0.01 when the quenching gas, M, was nitrogen and/or carbon monoxide. Reaction of methylene with trans-butene resulted in substantially the same ratio of rates for the singlet as with ketene (0.10 plus or minus 0.02); but the corresponding ratio for the triplet was somewhat lower (1.3 plus or minus 0.3). Percentages of singlet methylene, using the reaction with carbon monoxide as a diagnostic, were found to be 67% at 2900 Å, 59% at 3160 Å, 39% at 3340 Å, and much less than 40% at 3660 Å. (Author abstract modified)

38465

APTIC NO. 60833

Vaerman, J.

SOME CHARACTERISTICS OF LAMINAR DIFFUSION FLAMES. (Quelques caractéristiques des flammes de diffusion laminares). *Ind. Chim. Belge.*, 32(Special):653-657, 1967. 13 refs. Translated from French. Gas Council, Scientific Information Section, London (England), 10p., April 20, 1972.

Characteristics of confined laminar flames were studied with emphasis on the parameters which determine the geometry of the flame and the emission of soot. Flow-rate of the fuel and the rate at which oxygen is entrained by diffusion were the controlling factors for the height of hydrocarbon flames studied. A simple model was established which was independent of the nature of the hydrocarbon, using a constant interdiffusion coefficient for all flame heights; and a thorough study was made of the smoke point. Soot emission was found capable of modification without alteration of the geometrical characteristics of the flames by altering the confinement of the flame and diluting the combustible with an inert gas. The influences of concentration, temperature, and residence time on the soot forming process were also examined but without conclusiveness. (Author abstract modified)

1954

38466

APTIC NO. 60901

Sloan, C. K.

ANGULAR-DEPENDENCE LIGHT SCATTERING. I. BASIS FOR INTERPRETATION OF SCATTERING CURVES OF PARTICLES 0.1 TO 100 MICRONS IN RADIUS. Preprint, American Chemical Society, St. Louis,

Mo., 33p., 1954. 29 refs. (Presented at the American Chemical Society National Meeting, 125th, St. Louis, Mo., March 24-April 1, 1954, Paper 351.)

A new approach to the interpretation of angular-dependence light scattering data is described laying a basis for characterization of disperse systems with respect to dimensions and arrangement of the particles of the disperse phase. A convenient source of accurate intensity data over a wide angular range down to 0.05 deg is capable of being provided by a new high resolution light scattering instrument; such data are converted to a special graphical form, with the log of the quantity (light intensity times square of the angle) plotted against the log of the angle. Interpretation of the resulting curve is accomplished by considering it as a summation of curves obtained by comparable plots of the scattering from individual particles using classical diffraction equations. This method of plotting emphasizes the importance of the angular position of the initial rapid drop-off of intensity with angle as a means of characterizing the dimensions involved. The soundness of the approach is demonstrated by comparison with similar plots of published data obtained from the more complex Mie theory equations. In certain cases there is an advantage in plotting intensity in terms of log of the quantity (light intensity times the cube of the angle) and also in terms of log of the quantity (light intensity times the angle). The method allows for obtaining much useful information on size and size distribution without the necessity of determining concentration and refractive index factors. (Author abstract modified)

38467

APTIC NO. 60902

Sloan, C. K.

ANGULAR-DEPENDENCE LIGHT SCATTERING. II. INTERPRETATION OF LIGHT SCATTERING DATA FOR TYPICAL DISPERSE SYSTEMS. Preprint, American Chemical Society, St. Louis, Mo., 29p., 1954. 7 refs. (Presented at the American Chemical Society National Meeting, 125th, St. Louis, Mo., March 24-April 1, 1954, Paper 352.)

A method of interpreting light scattering curves is discussed with particular reference to the use of log of the quantity (light intensity times square of the angle) versus log of the angle curves for obtaining information of the size distribution and particle arrangement in typical disperse systems containing dimensions in the range of 0.1-100 micron. An outline is given of the experimental procedure for measuring the intensity of scattered light as a function of angle, using a new semi-automatic light scattering instrument that has a high resolution especially valuable in characterization of dimensions larger than about 2 micron. General rules are given for interpretation of the log of the quantity light intensity times square of the angle versus log of the angle curves, and several typical experimental curves are included to illustrate the type of information that can be obtained. (Author abstract modified)

EFFECTS-HUMAN HEALTH

1974

38468

APTIC NO. 60409

Adachi, S. and T. Okubo

ON THE RELATIONSHIP BETWEEN AIR POLLUTION AND THE FREQUENCY OF VOLUNTARY MEDICAL TREATMENT OF THE PEOPLES WHO HAVE JOINED IN NATIONAL HEALTH INSURANCE. (Taiki oson to kokuho-jushin su no kankei ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):108, April 1974. (Presented at the Japan Society of Hygiene, Annual Meeting, Nagasaki, Japan, April 2-4, 1974, Paper 213.)

The frequency of initial voluntary medical treatment for diseases belonging to categories C-39 and C-41 of International Classification Table-C, including acute infectious respiratory diseases, was investigated for 1 yr starting Jan. 1, 1971. Two neighboring areas, one polluted and the other not, were chosen for investigation. The average concentrations for the polluted/unpolluted areas were: sulfur dioxide 5.2/1.5 pphm, nitrogen dioxide 4.4/3.7 pphm, nitric oxide 5.9/3.7 pphm, oxidants 4.1/3.1 pphm, carbon monoxide 3.1/3.1 ppm, and floating dust 0.14/0.07 mg/cu m. In both areas, for people older than 10 yr, there was a large seasonal fluctuation in frequency of treatment, but this was uncorrelated with pollution levels. The frequency of treatment of children under 4 yr of age was higher in the polluted than in the unpolluted areas, especially for acute infectious respiratory diseases.

38469

APTIC NO. 61486

Breuer, Georg

AIR IONS AND HEALTH. (Luftionen und Gesundheit). Text in German. Naturw. Rundschau, 27(5):194-195, 1974. 6 refs.

Under normal conditions in clean air in unpopulated areas the air has an ion concentration of 1500 to 4000. The ratio of positive to negative ions in ground level air under normal conditions is 1.2:1. In polluted air the ions adhere to larger molecules, dust particles, or cigarette smoke and thus become biologically inactive. Apart from a drastic reduction of the total number of biologically active small ions the relation of positive ions to negative ions shifts with a pronounced reduction of the latter, causing fatigue, dizziness, migraine, and other symptoms in sensitive persons.

38470

APTIC NO. 60379

Caprio, Raphael, J., Harry L. Margulis, and Morris M. Joselow

LEAD ABSORPTION IN CHILDREN AND ITS RELATIONSHIP TO URBAN TRAFFIC DENSITIES. Arch. Environ. Health, vol. 28:195-197, April 1974. 11 refs.

The relationship between blood-lead levels in children and household location with respect to distances from major arterials and traffic density in the city of Newark, N. J. was examined. Two sets of data were cross-tabulated. The first was a cross-tabulation of residential distance from roadways versus blood-lead levels, while the second cross-tabulation included only those children living within 200 ft of a major roadway. The lead-exposure groups were then cross-tabulated by average weekday vehicle densities obtained from municipal and state surveys. Safe blood-lead levels were exhibited by 68% of the children residing in the interstitial areas (i.e., beyond 200 ft of a major roadway); while 57% of the children residing within 100 ft of a major roadway exhibited blood-lead concentrations equal to or greater than 40 micrograms/100 ml. Blood-lead levels of 40 micrograms/100 ml or more were also found in 62% of the children residing within 200 ft of an urban highway with an AWVD exceeding 24,000 (high vehicle density). The proportion of children with levels suggestive of lead poisoning (i.e., a blood-lead level of 60 micrograms/100 ml or more) more than doubled in the sample residing in areas that were exposed to vehicular densities exceeding 24,000.

38471

APTIC NO. 61252

Cohen, Arian A., Cornelius J. Nelson, Steven M. Bromberg, Mimi Pravda, Edward F. Ferrand, and George Leone

SYMPTOM REPORTING DURING RECENT PUBLICIZED AND UNPUBLICIZED AIR POLLUTION EPISODES. Am. J. Public Health, 64(5):442-449, May 1974. 23 refs.

Air pollution measurement data, demographic characteristics, and a telephone survey of irritating symptoms were obtained for three communities in the New York City area during publicized and unpublicized air pollution episodes in an effort

to determine whether moderate elevations of air pollution levels significantly increased the reported frequency of selected symptoms and to document any study bias introduced by widespread publicity about air pollution. No significant differences were noted between the publicized and unpublicized episodes; but significant increases in eye irritation, chest discomfort, shortness of breath, restricted activity, and medical visits during two high pollution episodes were evident. The data indicated that irritative symptoms may significantly increase when sulfur dioxide levels exceed 0.11 ppm and suspended particulate levels exceed 145 micrograms/cu m for several days.

38472

APTIC NO. 60395

Cucinell, Samuel A.

REVIEW OF THE TOXICITY OF LONG-TERM PHOSGENE EXPOSURE. Arch. Environ. Health, 28(5):272-275, May 1974. 14 refs.

A review of the literature concerning the effects of long-term phosgene exposure to animals and man leads to the recommendation that the nontoxic environmental concentration for a daily 8-hour working exposure (healthy adults medically evaluated and cleared for duty) be less than 0.08 mg/cu m (0.02 ppm) as opposed to the 0.1 ppm level adopted by the American Conference of Governmental Industrial Hygienists for 1971. Phosgene is reportedly responsible for the development of long-term lung disease in man as well as emphysema and obliterative bronchiolitis in dogs, although there is no quantitative data available on what dosage might cause permanent lung damage in man. Also, no data have been generated to indicate that persons with chronic respiratory disease have an increased susceptibility to short- or long-term phosgene poisoning. A nontoxic concentration of less than 0.0025 mg/cu m (0.0006 ppm) is recommended for a population subject to a 24 hr/day exposure. (Author abstract modified)

38473

APTIC NO. 60369

Cutchis, Pythagoras

STRATOSPHERIC OZONE DEPLETION AND SOLAR ULTRAVIOLET RADIATION ON EARTH. Science, 184(4132):13-19, April 5, 1974. 16 refs.

The effect of stratospheric ozone depletion caused, for example, by injection of nitrogen oxides into the stratosphere by a fleet of stratospheric aircraft is examined in terms of increase in solar ultraviolet radiation, particularly in the biologically important (e.g., erythema or skin cancer inducing) spectral region. Man-made depletion of ozone will have its greatest effects on the biologically harmful lower wavelengths and at higher latitudes; fortunately, the intensity of ultraviolet for such conditions is very weak. Ultraviolet radiation on the earth is a decreasing function of latitude because of increasing solar zenith angle and increasing amounts of ozone. Ultraviolet radiation in the biologically important spectral region decreases very sharply with decreasing wavelength due to the exponential behavior of the ozone absorption coefficient in this region (280-320 nm). Direct solar ultraviolet radiation will be exceeded by scattered sky ultraviolet radiation for solar zenith angles exceeding about 30 degrees, and for a solar angle of 30 degrees and 0.341 atm-cm of ozone the erythema dose on a horizontal surface would be approximately tripled if there were a 50% depletion in the amount of ozone.

38474

APTIC NO. 61106

Devereux, Theodora R. and James R. Fouts

N-OXIDATION AND DEMETHYLATION OF N,N-DIMETHYLANILINE BY RABBIT LIVER AND LUNG MICROSOMES. EFFECTS OF AGE AND METALS. Chem.-Biol. Interactions (Amsterdam), 8(2):91-105, 1974. 20 refs.

Certain factors influencing the metabolism of N, N-dimethylaniline (DMA) by rabbit liver and lung microsomes

were studied in vitro. The effects of pH, metal ions, and sulfhydryl reagents, as well as changes in DMA metabolism with age in the rabbit lung compared to the liver were studied. Lung N-oxidase enzyme activity was three times higher than liver N-oxidase at the optimum pH (8.9), while the activities were nearly the same at more physiological ranges of pH. The lung N-oxidase was stimulated twofold by 100 mM magnesium (2+) and by 0.1 mM mercury(2+), while liver N-oxidase activity was inhibited by these concentrations of ions. The response was not altered by preparing the microsomes in the presence of 50 mM EDTA at pH 7.6, indicating the differences were not due to the presence of endogenous metals. The difference may be due to tissue environment rather than to the enzyme itself. In contrast, 1 mM nickel (2+) enhanced liver N-oxidase activity by 30% and 5 mM Ni(2+) stimulated lung enzyme activity by 30%; concentrations above 20 mM were inhibitory to both N-oxidases. Both liver and lung demethylase activities were inhibited by these concentrations of Mg(2+), Hg(2+), and Ni(2+). The mercurial sulfhydryl reagents, para-chloromercuribenzoate and phenylmercurylacetate (0.1 mM) had the same effect as mercury chloride, inhibiting both demethylases and liver N-oxidase, but stimulating lung N-oxidase activity. However, 0.1 mM to 1 mM N-ethylmaleimide and iodoacetamide had little if any effect on either lung or liver N-oxidase. The Hg(2+) effects on N-oxidase activity could be overcome by dilution. Changes in DMA metabolism with age were followed in rabbits from 4 days old to adult. There was a steady increase in lung demethylase and liver and lung N-oxidase activity. The liver demethylase had a sharp increase in activity between 2 wk and 1 mo, much like that seen with benzphetamine demethylase in rabbit liver. Activities of N-demethylase in liver and lung and N-oxidase in liver from newborn rabbits were 10-20% of adult levels. In the lung, N-oxidase activities in the newborn were about 50% of adult levels. Microsomal N-oxidation in lungs from 2-day-old rabbits was stimulated by 0.1 mM Hg just as in the adult. (Author summary modified)

38475

APTIC NO. 60393

Drinkwater, Barbara L., Peter B. Raven, Steven M. Horvath, Jeffrey A. Gliner, Robert O. Ruhling, Nils W. Bolduan, and Sadayoshi Taguchi

AIR POLLUTION, EXERCISE, AND HEAT STRESS. Arch. Environ. Health, vol. 28:177-181, April 1974. 20 refs.

Twenty young men, smokers and nonsmokers, were tested for maximal aerobic power (treadmill walk) in a 35 C environment under four ambient air conditions: filtered air (FA); 50 ppm carbon monoxide (CO); 0.27 ppm peroxyacetyl nitrate (PAN); and CO plus PAN. Carbon monoxide was effective in reducing the work time of the nonsmokers and in eliciting changes in the respiratory patterns of both smokers and nonsmokers, while no significant physiological effects were noted during the PAN exposure. Maximal aerobic power was not affected by any pollutant condition. Heat stress was more effective in reducing work capacity than any pollutant condition, and the 4.3% decrease in maximal aerobic power from the 25 to 35 C environment was greater than the differences in aerobic power found between filtered air and any of the pollutant conditions. Additional studies at 75 or 100 ppm CO are required to determine whether the test observations mark a critical level of carboxyhemoglobin for nonsmokers, a point beyond which their performance would continue to deteriorate. (Author abstract modified)

38476

APTIC NO. 60397

Durham, William H.

AIR POLLUTION AND STUDENT HEALTH. Arch. Environ. Health, 28(5):241-254, May 1974. 12 refs.

The health effects of air pollution on student populations at seven California universities were investigated during the 1970-1971 academic year. The combined use of a spatiotemporal control strategy, morbidity data focused on the appearance of

symptoms, and a time-series analysis permitted a relationship to be made between inter-school differences in respiratory illness rates and the gradient of pollution levels in the Los Angeles basin. Pharyngitis, bronchitis, tonsillitis, colds, and sore throats were associated primarily with photochemical oxidants, sulfur dioxide, and nitrogen dioxide. A comparison of selected high- and low-pollution days indicated that air pollution may well be responsible for a 16.7% increase in these respiratory symptoms between Los Angeles schools situated in the lowest and highest contaminant concentrations. (Author abstract modified)

38477

APTIC NO. 61499

Einbrodt, H. J., J. Rosmanith, U. Primas, and F. Thomas

THE LEAD LEVEL OF THE BLOOD OF CHILDREN FROM A POLLUTED INDUSTRIAL AREA. (Der Blutblei-Spiegel bei Kindern in einem kontaminierten Industriegebiet.). Text in German. *Naturwissenschaften* (Berlin), 61(1):35-40, 1974. 2 refs.

In an industrial area near Aix la Chapelle (Federal Republic of Germany) which is heavily polluted by lead, 395 children were selected from a group of roughly 9000 aged 2 to 14 years for determination of blood lead levels. In only 1.5 % of the examined children were lead concentrations of higher than 40 micrograms/100 ml found. The lead concentration in the atmospheric dust of the area was 100% higher than the recommended maximum allowable emission concentration of 2 micrograms/cu m. A dependence of the lead level on age was not observed.

38478

APTIC NO. 60387

Gershanik, Juan J., G. Gary Brooks, and Joseph A. Little

FETAL BLOOD LEAD VALUES IN A RURAL AREA. *J. Pediatr.*, 84(11): 112-113, Jan. 1974. 10 refs.

Lead levels were determined from neonatal samples of blood collected at a general-care hospital, and cord blood lead levels of babies from urban maternal residences were significantly higher than those from rural environments. The mean blood lead level for urban cord samples was 9.7 ± 3.9 micrograms/100 ml as compared with rural levels of 8.3 ± 2.4 micrograms/100 ml. Although the difference was probably multifactorial, it correlated with atmospheric lead concentrations. The study also found a lower mean blood lead value than other apparently similar surveys; the overall cord blood lead value was 9.4 ± 3.7 micrograms of lead per 100 ml of whole blood.

38479

APTIC NO. 61009

Gubergits, M. Y., A. B. Linnik, L. P. Paalme, and L. M. Shabad

STUDY ON THE BLASTOGENICITY OF THE PHOTOINITIATED OXIDATION PRODUCTS ON BENZO(A)PYRENE. (Issledovaniya blastomogennosti produktov fotoinitirovannogo okisleniya benz(a)pirena). Text in Russian. *Vopr. Onkol.*, 20(1):77-80, 1974. 7 refs.

The blastogenicity of the photodegradation products of benzo(a)pyrene was studied in mice in a 1-year experiment. Benzo(a)pyrene in benzene, acetone, ethanol, or octane was photooxidized at a maximum wavelength of 365 nanom, after which 0.5 ml solution of the photooxidation products, containing variable quantities of residual intact benzo(a)pyrene, equivalent to 2 mg benzo(a)pyrene, was injected to the mice. A control group received 2 mg intact benzo(a)pyrene. The frequency of sarcomas at the site of inoculation was 80.64% in the control group, and 5-37% in the test groups. Close correlation between the residual quantity of benzo(a)pyrene in the photooxidation products and the frequency of the sarcomas was established, which is indicative of the absence of carcinogenic effects of the photooxidation products of benzo(a)pyrene. Thus, photodegradation may be suitable for rendering benzo(a)pyrene non-carcinogenic. Quinones and ox-

ypen derivatives of benzo(a)pyrene were the chief photodegradation products.

38480

APTIC NO. 61102

Gus'kova, Y. I.

GERMANIUM HYBRIDE TOXICOLOGY. (K toksikologii gidrida germaniya). Text in Russian. *Gigiena Truda i Prof. Zabolevaniya*, no. 2:56-57, 1974. 4 refs.

The acute and chronic toxicity of germanium hydroxide was studied in inhalation tests on mice, rats, and guinea pigs to determine the maximum allowable concentration in the air. The LC50, LC16, and LC84 values for albino mice were 1380 mg/cu m; 950 mg/cu m, and 1830 mg/cu m, respectively. Motor dyscoordination, convulsions, pronounced vascular lesions, and dystrophy of the liver and kidney were found in acute poisoning tests. The minimal acute concentration was found to be 255 mg/cu m. In chronic inhalation tests with the minimal acute doses and smaller doses, reduction of the oxygen consumption, temporarily reduced hemoglobin level, and an increased erythrocyte count were observed. The highest ineffective dose was 2.45 mg/cu m. The maximum allowable concentration of germanium hydride in the air was set at 5 mg/kg.

38481

APTIC NO. 60422

Hain, E. and P. Dalquen

CATAMNESTIC STUDIES OF THE GENESIS OF MESOTHELIOMA. RETROSPECTIVE STUDY OF 150 CASES OF MESOTHELIOMA IN HAMBURG AREA. (Katamnestiche Untersuchungen zur Genese des Mesothelioms. Bericht Ueber 150 Faelle aus dem Hmaburger Raum). Text in German. *Int. Arch. Arbeitsmed.*, 33(1):15-37, 1974. 43 refs.

Two hundred and fifty-one cases of mesothelioma were diagnosed in the Hamburg area from 1958 to 1968 by post-mortem examination. In 150 of these cases a full social and occupational history was obtained retrospectively. Of 85 cases with occupational exposure to asbestos dust, there were 18 with massive exposure in the asbestos textile and insulating industries, and 67 with a lower degree of exposure in various occupations, particularly in the navy and in ship-building. In a control group only 35 patients were exposed due to their occupation. Twenty cases of mesothelioma lived in the neighborhood of an asbestos factory. The mean age at death is 65 yr, the latent period about 40 yr. These findings are consistent with other international results. Mesothelioma should therefore be recognized as an occupational illness if the diagnosis is well established clinically. Exposure to asbestos dust for at least 2 yr and a latent period of 20 yr should precede the disease; these time intervals might be shorter with massive exposure.

38482

APTIC NO. 60396

Hammer, Douglas L., Victor Hasselblad, Bernard Portnoy, and Paul F. Wehrle

LOS ANGELES STUDENT NURSE STUDY. *Arch. Environ. Health*, 28(5): 255-260, May 1974. 40 refs.

Student nurses in the Los Angeles area completed diaries of daily symptom rates which were then compared to daily maximum hourly measurements of photochemical oxidants, carbon monoxide, nitrogen dioxide, and maximum daily temperature recorded at a nearby monitoring station. Eye discomfort, cough, and chest discomfort all increased with maximum hourly photochemical levels; headache also increased when symptoms are adjusted for intercurrent morbidity. The relative increase of adjusted symptoms on highest oxidant days (greater than 0.40 ppm) ranged from 1.4 for headache to 6.1 for eye discomfort. Temperature, carbon monoxide, and nitrogen dioxide did not explain these associations; nor were cigarette smoking, a history of allergies, or bias in symptom reporting likely confounding factors. (Author abstract modified)

Ishinishi, N., Y. Kodama, and E. Kunitake

AN EPIDEMIOLOGICAL STUDY OF THE MORTALITY DUE TO LUNG CANCER IN THE INHABITANTS OF KITAKYUSHU CITY (YAWATA WARD) AND OF FUKUOKA CITY. (Kitakyushu-shi (Yawata-ku) oyobi Fukuokashi jumin no haigan shiboritsu ni kansuru ekigakuteki kenkyu). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):114, April 1974.

The etiology of lung cancer was studied, based on the notices of death which were classified by age, smoking history, and residence history from analytical epidemiological studies. In the highly polluted Yawata Ward, mortality due to lung cancer was larger in the more polluted area. The authenticity of diagnosis seemed to be higher in the slightly polluted Fukuoka City than in the Yawata Ward. There was no difference between the two cities as to mortality due to lung cancer in men older than 20; however, there were clear differences in mortalities when classified to as smokers and workers in harmful trades. In non-smoking women with harmless occupations the corrected mortality for 100,000 was 9.01 in Yawata and 2.34 in Fukuoka. The causes of lung cancer in decreasing order of importance are smoking, occupational health, and air pollution.

38484

APTIC NO. 61553

Kagawa, J. and T. Toyama

EFFECTS OF OZONE INHALATION AND EXERCISE ON AIRWAY RESISTANCE. (Ozon kyunyu to undo no kido teiko ni oyobosu eikyo). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):98, April, 1974. (Presented at the Japan Society of Hygiene, Annual Meeting, Nagasaki, Japan, April 2-4, 1974, Paper 203.)

Experiments were carried out to see the effects of ozone and exercise on airway resistance by simulating the conditions in which 5 min of exercise were done in an atmospheric ozone concentration of 0.9 ppm using four healthy medical students including one smoker, the exercise being carried out on an ergometer in a body-plethysmograph at a rate of 100 watts and 50 rpm. The data was represented by specific airway conductance and the percentage variation of specific airway conductance (SAC) from a basal value determined 5 min before each episode (exercise only, inhalation only, and exercise while inhaling ozone). Each episode was carried out on different, but consecutive 4 days in the above-mentioned order. The findings of the experiments were: during the exercise three students (nonsmokers) showed significant airway dilation, during the inhalation of ozone all four students showed a trend of airway stricture (significant in two students), and the exercise under ozone-containing atmosphere gave an increase of ventilation on three students; however, the individual difference of the response was noticeable.

38485

APTIC NO. 61196

Kaufman, Leon and Gordon Gamsu

FLUORESCENT EXCITATION IN THE MEASUREMENT OF CLEARANCE OF HEAVY METALS FROM THE LUNGS. IEEE (Inst. Elec. Electron Engrs.) Trans. Nucl. Sci., NS-21(1):721-725, Feb. 1974. 7 refs.

The technique of fluorescent excitation for measuring clearance of particulate tantalum and barium sulfate from the lungs of dogs was evaluated using a 2 Ci gadolinium-153 source and an 80 sq mm lithium doped silicon detector. Magnification roentgenograms of the chest were obtained and the site of the tantalum or barium sulfate ascertained fluoroscopically in two planes; fluorescent excitation of the localized material was performed for quantification. The material spreads after the first few days became less visible in the radiographs, suggesting clearance; but the amount determined by fluorescent excitation remain unchanged. The technique proved to be safe and simple for quantitating and monitoring the clearance of particulate heavy metals from the lung.

170

Kimura, Kikuji

STUDIES ON THE DEPOSIT OF AEROSOL ON RESPIRATORY TRACT. (Earozoru no kokyu kido chinchaku ni kansuru kenkyu). Text in Japanese. Ochanomizu Igaku Zasshi (Ochanomizu Med. J.), 22(1):1-12, March 1974. 21 refs.

Aerosol containing simple-dispersed, uni-sized polystyrene latex or polyvinyltoluene latex (sp. gr. 1.0) was used for a study of aerosol deposition in the respiratory tract. Subjects were allowed to stand steady or to exercise for 2.5 min before the respiration experiment. Aerosol and carbon dioxide concentrations at respiration rates of 20 and 10 were measured and accompanied by respiration diagrams. Results revealed that the rate of deposition increased as the respiration rate decreased and the rate of deposition during exercise was higher than that during rest. The rate of deposition was dependent on tidal volume rather than on respiration rate. The deposition rate in different parts of the respiratory tract varied with the particle size of the aerosol and the respiration conditions. The deposition in the lower respiratory tract became more significant as the tidal volume increased.

38487

APTIC NO. 61556

Kita, H. and S. Omichi

EFFECTS OF AIR POLLUTANTS ON CILIAL MOVEMENT IN AIRWAYS. (Kido senmo undo ni oyobosu taiki osen busshitsu no eikyo). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):100, April 1974. (Presented at the Japan Society of Hygiene, Annual Meeting, Nagasaki, Japan, April 2-4, 1974, Paper 205.)

Experiments were carried out by counting the number of movements per unit time of the cilia of cilia cells taken from a guinea pig's trachea and prepared as a specimen between a coverglass and cellophane sheet soaked previously with physiological saline for a phase microscope, the change of light by the cilia movement being converted electrically and recorded. Introduction of gaseous pollutant into the specimen was done by a permeation tube. When sulfur dioxide was introduced at the rate of 100 ml/min and respective concentrations of 15, 32, 58, and 77 ppm, no reduction of cilia movement was noticed for 6 min at 15 ppm, but the movement was reduced to about 54% at 32 ppm. When nitrogen dioxide was introduced at the same rate and at respective concentrations of 38 and 120 ppm, the movement was reduced to about 90% at 38 ppm for 6 min. Thus, the degree of disturbance of the cilia movement for NO₂ was lower than that for SO₂.

38488

APTIC NO. 61557

Kubo, M., T. Nakajima, S. Kusumoto, Y. Tsubota, and E. Yonekawa

CHANGE OF LEUKOCYTE AND ALKALINE-PHOSPHATASE OF THE MICE EXPOSED TO OZONE AND PHOTOCHEMICAL OXIDANT. (Ozon oyobi kokagaku okishidanto bakuro mausu no hakkekkyu, arukari hosufataze no hendo). Text in Japanese. Nihon Jibi Inkoka Gakkai Kaiho (Jap. J. Otorhinolaryngol. Soc.), 77(1):93, Jan. 1974. (Presented at the Japan Otorhinolaryngological Society, 64th, Osaka Local Meeting, Feb. 17, 1973.)

Because of the clinical findings on the victims of photochemical smog which occurred in Sakai City the summer of 1972, symptoms in the upper airway, leukocytosis, the increase of the ratio of neutrocyte to lymphocyte, and information on serum alkaline-phosphatase were studied. Mice were exposed to ozone of 3 + or - 0.5 ppm for 3 hr and to 0.1-0.5 ppm oxidant daily for 2 hr, 5 days/wk for 3 mo. The RBC increased just after the exposure to 5 hr; WBC increased after 15 hr of the exposure. The ratio of neutrocyte to lymphocyte showed an increasing tendency, however, serum alkaline phosphatase did not increase.

38489

APTIC NO. 61141

Lahoda, F.

EXOGENIC TOXIC SYMPTOMS OF THE NERVOUS SYSTEM. (Exogen-toxische Erscheinungen des Nervensystems). Text in German. Muench. Med. Wochschr. (Munich), 116(16):823-824, 1974.

A survey of the knowledge of exogenic toxic symptoms of the nervous system in antiquity and the Middle Ages is given and the symptoms of lead, mercury and alcohol intoxication are reviewed. Of the air pollutants found today in densely populated and industrialized areas intermittently occurring high carbon monoxide concentrations play the most important role. Strong headaches, dizziness, fatigue, somnolence are the symptoms many suffer from when the CO concentration rises. From policemen regulating traffic it is known that as a consequence of acute CO intoxication irreparable brain damage may be incurred (known as CO encephalitis). An influence of air pollutants on the aging process is considered very probable due to the results of a statistical investigation according to which the average life expectancy of the population in the Federal Republic of Germany dropped for the first time in 1970 despite the considerable medical progress.

38490

APTIC NO. 61099

Metivier, Henri, Jean-Claude Nenot, Roland Masse, Daniel Nolibe, and Jacques Lafuma

CLINICAL STUDY OF THE PULMONARY PURIFICATION IN MONKEYS AND DOGS. (Etude clinique de l'épuration pulmonaire chez le singe et le chien). Text in French. C.R. Acad. Sci. Paris, Ser. D, 270(5):671-674, Jan. 1974. 15 refs.

The alveolar or slow pulmonary purification was studied on baboons and a beagle which had inhaled radioactive aerosols (iron oxide, polystyrene balls, and gold colloid) by scintillation detector. The purification periods in the baboons averaged 182 days for hematite, 130 days for polystyrene balls, and 360 days for colloidal gold. The purification periods determined for hematite and polystyrene in beagles are 222 days and 146 days, respectively. The corresponding periods of rapid purification were 1.64 days, 1.63 days, and 0.86 days in baboons, as well as 1.30 days and 2.49 days for hematite and polystyrene in beagles. The values obtained for the slow pulmonary purification periods in these species are not comparable with those obtained for small animals such as cats and rats.

38491

APTIC NO. 61507

Murayama, N. and Y. Nakagawa

ON THE RELATIONSHIP BETWEEN AIR POLLUTION BY AUTOEXHAUST AND THE HEALTH STATES ON INHABITANTS IN MATSUMOTO CITY, ESPECIALLY THEIR CO-HEMOGLOBIN AND SYMPTOMS. (Matsumoto-shi ni okeru jidosha haigasusosen to jumin no kenko, kotoni CO-Hb to shoujo tonon kankei ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan J. Hyg.), 29(1):111, April 1974.

An investigation was carried out in the middle scale city of Matsumoto on air pollution, especially carbon monoxide due to auto exhaust and the health state of inhabitants in the commercial center of the city, of middle schoolchildren along the national road, and on traffic policemen. In crossings of narrow roads the traffic jams, the concentration of lead, CO, floating dust, and noise showed a high correlation to the number of running motor vehicles. The blood carboxyhemoglobin was higher than in rural areas; and the nearer to the road crossing, the more open the room, and especially the later the evening, the higher the COHb. A higher rate of poor health and of complaints such as headaches were found in persons who showed COHb higher than 1.5%.

38492

APTIC NO. 61301

Nobutomo, K., N. Ishinishi, T. Shirohi, N. Miyazaki, and N. Shigematsu

COMPARISON OF SPUTUM BETWEEN INHABITANTS OF OMUTA AND FUKUOKA CITIES BY CYTOLOGICAL DIAGNOSIS OF SPUTUM. (Kattan saibo-shin ni yoru Omuta, Fukuoka ryoshi no kattan hikaku). Text in Japanese. Nippon Eiseigaku Zasshi (Japan J. Hyg.), 29(1):112, April 1974.

The response of respiratory systems to air pollution was studied pathologically. Sputum obtained from the citizens of Omuta and Fukuoka within 1 hr of their rising in the morning was cytologically examined for subjective respiratory symptoms, amount of sputum, and the effect of smoking. The morbidity of cough plus sputum was higher in Omuta and the color of the sputum was more yellow. The number of alveolar phagocytes and neutrophils in sputum was generally larger in elderly persons; however, morbidity was higher in Omuta for every person over 40. Inhabitants of polluted areas such as Omuta have decreased the self cleaning function of the lung and acquired some tracheal infection. Allergic reactions were not noted.

38493

APTIC NO. 61403

Oyagi, S.

RELATION BETWEEN TRAFFIC JAM AND ACCUMULATIVE ONSET OF CANCER. (Kotsu jutai to gan no shussei hassei). Text in Japanese. Hokenfu Zasshi (Japan J. Public Health Nurse), 30(1):68-71, Jan. 1974.

Distribution maps of cancer mortality from 1966 to 1970 have been made with Yangicho Crossing (Tokyo) as a center and it was found that mortality was inversely proportional to distance from the center. Mortality was eight times higher 100 m from the center than 400 m from the center. Stomach cancer mortality showed the same trend. There was an especially high incidence of lung cancer within a 200 m radius of the Yanagicho Crossing center. An investigation of total mortality within a 200 m radius from pulmonary emphysema, chronic bronchitis, and bronchial asthma showed a peak in 1963-1965, and mortality from lung and pancreatic cancer showed a peak in 1967. The cause is considered to be a substance that once existed in high concentrations and shows a time lag with respect to its induction of respiratory diseases and lung cancer. Prime suspects are carbon monoxide, lead, and 3-4-benzopyrene.

38494

APTIC NO. 61442

Pankow, D., W. Pansold, and I. Grimm

THE ENHANCEMENT OF THE CARBON TETRACHLORIDE HEPATOTOXICITY THROUGH CARBON MONOXIDE. (Zur Potenzierung der Tetrachlorkohlenstoff-Hepatotoxizität durch Kohlenmonoxid). Text in German. Deut. Gesundheitsw., 29(18):853-856, 1974. 32 refs.

The enhancement of the hepatotoxicity of carbon tetrachloride through carbon monoxide was studied in rats. Workers exposed to CCl₄ are in danger if they smoke or inhale CO-containing waste gases. The rats received 5.2 mmol CCl₄/kg body weight and 4 hr later subcutaneous CO injections in various dosages. In further experiments rats received within 3-6 1/2 wk 13 or 32 times a CO dose of 0.6 mmol/kg. The enhancement of leucine aminopeptidase and glutamic-pyruvic transaminase activity induced by CCl₄ is potentiated after subcutaneous carbon monoxide injection. The CO liberates adrenalin which in turn increases the CCl₄ hepatotoxicity.

38495

APTIC NO. 60399

Rees, E. van

THE PARTITION COEFFICIENTS OF STYRENE BETWEEN BLOOD AND AIR AND BETWEEN OIL

AND BLOOD. *Int. Arch. Arbeitsmed.*, 33(1):39-47, 1974. 6 refs.

The lipid-soluble substance styrene exhibits a constant respiratory uptake during a long period of industrial exposure to its vapor. To evaluate the kinetics of this substance it is necessary to know its partition coefficients between blood and air, and between adipose tissue and blood. The partition coefficient between non-adipose tissue and blood is usually considered to be one. A new sampling procedure for the spectrophotometric determination of styrene in blood, water, olive oil, and air is described. With this procedure the partition coefficients were determined at 37 C, taking olive oil as a substitute for human adipose tissue. The partition coefficients of styrene between water and air were calculated to be 4.38, between blood and air 32, and between oil and blood about 130. Thus diffusion through the alveolar membrane constitutes no rate-limiting factor for the respiratory uptake of styrene vapor and the adipose tissue compartment has a large storage capacity for styrene.

38496

Robinson, P. E.

APTIC NO. 61323

LEAD AND ENVIRONMENT. (Blei und Umweltschutz). Text in German. *Metallwirtsch. Metallmarkt*, 28(1):76-78, Jan. 1974.

There seems to be a wide-spread over emphasis of the danger of lead inhaled with the polluted air. The seven city study expanding over a period of four years, which compared the blood lead levels of 2000 test persons with the atmospheric lead concentration, showed that there was very little connection between the blood lead concentration and the atmospheric lead concentration. Other studies have shown that the blood lead level of urban residents in the U. S. was not higher than that of the population in scarcely populated regions in New Guinea and Africa. The danger of lead intoxication of children through lead-containing paint or through ingestion with food is far greater.

38497

Rosenstock, J., W. Hilscher, G. Koenn, A. Brockhaus, and H. Steiger

APTIC NO. 61249

MORPHOLOGIC CHANGES IN THE BRONCHIAL WALLS AND THE PROPORTION OF DUST IN THE LUNG IN 139 CASES OF SUDDEN DEATH WITHOUT A PROFESSIONAL CHARGE DUE TO DUST. (Morphologische Veränderungen an der Bronchialwand und Staubgehalt der Lungen in 139 plötzlichen Todesfällen ohne bekannte berufsbedingte Staubbelastung). Text in German. *Respiration*, 31(2):152-176, 1974. 60 refs.

Quantitative semi-quantitative, and morphological examinations of bronchi and lung dust from 139 cases of sudden death showed the following features: the proportion of goblet cells to ciliated cells was about 1:20 for healthy mucous membranes of bronchi and about 1:4 for cases of severe chronic bronchitis; the numerical augmentation of goblet cells, the increase of mucous parts of the bronchial mucous membrane, and the density and expansion of round cells appeared as reliable criteria for the histological diagnosis of chronic bronchitis; and the thickness of the basement membrane of the bronchial wall was not confirmed as a histological criterion for chronic bronchitis. The relationship of air pollution to chronic bronchitis was not possible to assess since the endogen and exogen factors which influence the rise, development, and the deterioration of chronic bronchitis could not be marked off by histological methods.

38498

Sato, T., K. Saito, E. Takakuwa, and Y. Sato
A PROPOSAL IN EVALUATING THE PHYSIOLOGICAL VALUE OF LEAD IN BLOOD. (Kecchu-en no seirichi hyoka ni kansuru ichi teigen). Text in Japanese. *Nippon Eiseigaku Zasshi* (Japan. J. Hyg.), 29(1):137, April 1974.

APTIC NO. 61246

172

AIR POLLUTION ABSTRACTS, AUGUST 1974

After a detailed discussion on the relation between the lead content of the blood and the activity of delta-aminolevulinic acid dehydrogenase obtained on motor-patrol policemen and printers in a newspaper office, a proposal on the physiological value was described. On the motorpatrol policemen there was a negative correlation between lead in blood and the activity of delta-aminolevulinic acid dehydrogenase only when the former value was larger than 10 micrograms/dl. This negative correlation was also found on printing workers, all of them showing lead in their blood larger than 10 micrograms/dl. Such a correlation was also found on workers in a lead alloy factory. These negative correlations show that lead causes the decrease of the activity of delta-aminolevulinic acid dehydrogenase, and because these negative correlations were found when lead concentration in blood was over 10 + or - 3 (sigma) micrograms/dl, the upper threshold of physiologically normal value seems to be in the above-mentioned value.

38499

APTIC NO. 61481

Scanlon, John W., Alan H. Kaufman, Jonathan Fuerbinger, Donald C. Shukan, James King, Fred Mandel, and Herbert Needleman

WHAT ARE THE ENVIRONMENTAL HAZARDS TO THE HEALTH OF CHILDREN? *Chin. Pediatr.*, 13(4):322-327, 346, April 1974. 12 refs.

The results of a questionnaire survey of Massachusetts pediatricians on identifying the environmental hazards to the health of children are presented. There were 62 responses (17%) from the 364 pediatricians to whom the questionnaire had been mailed. Air pollution was named the major environmental hazard facing children by 25 doctors. Nine doctors named air pollution as causing or aggravating pre-existent respiratory problems. Stricter controls of air pollution and factory emissions were named by four doctors as necessary statewide programs in the area of environmental hazards and child health. Twenty three pediatricians stated they had observed a relationship between air pollution and chronic respiratory disease. Eight noted this to be a definite serious problem mostly confined to cities. Two noted a limited increase of chronic respiratory disease associated with air pollution.

38500

APTIC NO. 60398

Sebayashi, T. and K. Ozaki

EFFECT OF PHOTOCHEMICAL SMOG ON CHILDREN'S HEALTH AND AGENTS OF AIR POLLUTION (II) SUBJECTIVE SYMPTOMS AND RESPIRATORY RESISTANCE VALUES OF MIDDLE SCHOOL. (Kokagaku sumoggu ni yoru gakudo no kenko shogai to taiki osen busshitsu -2- 2nen renzoku kokagakusumoggu higai-ko de mirareru jikaku shoyo to kokyukino chosa). Text in Japanese. *Koshu Eisei* (Public Health), 38(1):42-46, Jan. 1974. 19 refs.

The respiratory functions, subjective symptoms, and environmental situations under normal conditions of schoolchildren who were exposed to photochemical smog in the suburbs of Kobe city during the summers of 1972 and 1973 were investigated. Twelve patients in 1972 and 47 in 1973 suffered from the smog while taking outdoor exercise. The subjective symptoms were 11.0 and 20.2% ocular, 63.0 and 72.0% respiratory, 0 and 2.8% circulatory, and 26.0 and 5.0% general in 1972 and 1973 respectively. Respiratory resistance determined four and seven days after exposure by the oscillation method was higher in injured than in non-injured children and was inversely proportional to body height. Although the concentration of primary pollutants was lower than in the city, the concentration of oxidants was higher. In this respect and with regard to the subjective symptoms, these two incidents of photochemical smog differ from those in Tokyo and Osaka in 1971 and 1972. The injuries reported here are due to the inhalation of oxidant-laden air during exercise resulting in irritation of the mucosa and attack on the respiratory system.

38501

APTIC NO. 60405

Shimada, T. and O. Iizumi

RESULT OF THE INVESTIGATION ON THE EFFECT OF AIR POLLUTION OF SCHOOLCHILDREN IN FUJI DISTRICT OF SHIZUOKA PREFECTURE. (Shizuoka-ken Fuji-chiku no okeru gakudo no taiki osen eikyo chosa: bikiyo shoken to kyukaku kensa kara). Text in Japanese. Nihon Jibi Inkoka Gakkai Kaiho (Jap. J. Otorhinolaryngol. Soc.), 77(1):72-79, 1974. 6 refs.

In Fuji City the exhaust of paper manufacturing factories and Kraft pulping is responsible for sulfur dioxide levels of 0.075 ppm (1969) and odors from dimethyl sulfide, hydrogen sulfide, and methyl mercaptan. Therefore 445 children from a primary school in a highly polluted (0.05-0.07 ppm SO₂) area and 415 children from a primary school in a lightly polluted (SO₂ less than 0.03 ppm) area were examined to determine the frequency of nasal diseases and the threshold of the sense of smell. The morbidities of chronic paranasal sinus, chronic rhinitis, and nasal allergy in children in the highly polluted area were 9.9, 10.6, and 5.2% respectively in 1970, and 13.5, 8.2, and 4.9% respectively in 1971 as compared to the values for the slightly polluted area of 3.8, 10.3, and 2.7% respectively in 1970, and 7.9, 4.5, and 2.4% respectively in 1971. Some differences in the threshold values for the sense of smell of d-camphor and gamma-undecalactone were detected, but none for isovaleric acid.

38502

APTIC NO. 61234

Takemoto, K., H. Katayama, K. Namie, R. Endo, and K. Tashiro

EFFECTS OF AIR POLLUTION ON THE ORNITHO-RESPIRATORY SYSTEM, PART IV. PATHOLOGY OF DOVE'S LUNG. (Taiki osen no tori kokyuki ni oyobosu eikyo (4) nobato hai no byori). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):106, April 1974. (Presented at the Japan Society of Hygiene, Annual Meeting, Nagasaki, Japan, April 2-4, 1974, Paper 211.)

Lungs of 541 doves in the air polluted Tokyo and Kawasaki areas and of 103 doves in non-polluted neighboring areas were examined by electron microscopy. Sections were taken through the pulmonary hilus and the trachea. The deposition and state of aggregation of dust in secondary and tertiary bronchi were classified into five groups: heavy, fibrous proliferation (partly from granulation), moderate, slight, and suspicious to none. The percentage of degree of pollution higher than moderate was 23.7 in Tokyo (commercial zone), 24.4 in Kawasaki (industrial zone), and only 7.8 in non-polluted residential areas, clearly showing a higher degree of pathological change of dove lungs in the polluted areas. There was a remarkable difference in the relationship of lung damage to age depending on the pollution of the bird's environment. In the polluted areas lung damage is correlated to age, but not in the unpolluted areas. Doves are most suitable for studies of the effects of air pollution on lungs because of the weak filtering ability of their nasal cavities. It is presumed that the degree of lung pollution of doves is ten times higher than that of man.

38503

APTIC NO. 61284

Tani, S., A. Yoshida, T. Motomiya, M. Adachi, and K. Hayashi

RESULTS OF INVESTIGATION ON THE MORBIDITY RATIO OF RESPIRATORY DISEASES IN FUJI CITY. (Fuji-shi ni okeru kokyuki shoyo yusho-ritsu chosa seiseki). Text in Japanese. Nippon Eiseigaku Zasshi (Jap. J. Hyg.), 29(1):109, April 1974.

The relationship between air pollution and chronic respiratory diseases in Fuji city was studied. Sulfur dioxide concentrations were 1.12, 1.30, 0.67, 0.65, 0.62, and 0.54 mg/day/100 cu cm in six areas. The morbidity % of coughs was 9.8, 6.5, 3.4, 5.6, 5.5, and 6.9 in these areas, respectively, with an average of

6.4. The morbidity % of sputum was 14.7, 10.6, 11.9, 9.8, 6.1, and 10.3, respectively, with an average of 10.7. Chronic bronchitis symptoms were 7.4, 6.5, 3.4, 3.5, 3.5, and 4.4 morbidity %, respectively, with an average of 5.2. Sulfur dioxide correlated with morbidity in each area.

38504

APTIC NO. 60309

Tarkowski, Stanislaw

ACTIVITY OF GLUTAMATE DECARBOXYLASE IN THE BRAIN OF RATS EXPOSED TO CARBON DISULFIDE. Int. Arch. Arbeitsmed., 33(1):79-82, 1974. 10 refs.

The activity of glutamate decarboxylase in the brain of white rats exposed to carbon disulfide was measured. The lower activity of the enzyme in rats intoxicated with CS₂ was parallel to the decreased level of gamma-aminobutyric acid. Pyridoxal phosphate did not prevent inhibition of the enzyme activity. Apparently the inhibition of the activity of glutamate decarboxylase by CS₂ is responsible for the lower level of gamma-aminobutyric acid in the brain of rats intoxicated with CS₂.

38505

APTIC NO. 61223

Tashiro, K., K. Namie, K. Takemoto, and E. Hisazumi

EFFECTS OF AIR POLLUTION ON THE RESPIRATORY SYSTEM OF ANIMALS IN A ZOOLOGICAL GARDEN. (Dobutsuen shiiku dobutsu no kokyuki-kei ni taisuru taiki osen no eikyo (2)). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):107, April 1974. (Presented at the Japan Society of Hygiene, Annual Meeting, Nagasaki, Japan, April 2-4, 1974, Paper 212.)

An investigation was made of lung damage in dead birds from the Unio Zoological Garden and the findings were related to the duration and state of breeding periods. There were 439 specimens and they included members of the Sphenisci, Pelcani, Ciconni, Anseri, Falconi, Caprimulgi, Galli, Gruvi, Charadi, Columbi, Psittaci, Cuculi, Strigi, Passeri, Pici, and others. The longer the breeding period, the heavier was the degree of lung pollution. In birds bred outdoors the pollution increased rapidly over a three year period, but birds bred indoors showed no evidence of severe pollution even after six years. Passeri, Galli, and Anseri birds were highly polluted over short breeding periods, and Galli and Anseri also were highly polluted over longer breeding periods. Columbi gave intermediate values, with lung pollution proportional to breeding period. Examination of birds bred in zoos can be useful indices of short-term pollution.

38506

APTIC NO. 61577

Tsuchiya, K.

THE ENVIRONMENTAL JUDGEMENT FROM THE MEDICAL STANDPOINT. (Igaku teki kanten kara mita kankyo shindan). Text in Japanese. Kankyo Sozo (Environ. Creation), 4(1):62-67, 1974.

To judge the environment from a medical standpoint, both man-made and natural pollution must be considered. It is possible to determine if an environment is polluted or not by studying the body burden of heavy metals or other pollutants in humans. The critical organ to be tested depends on the type of metal. For example, the target organs of lead are circulatory organs or the nervous system and those of cadmium are respiratory organs or the kidney. The problem with using biological materials as indices of pollution is that errors of measurement generally become much more noticeable in cases with a low degree of pollution.

38507

APTIC NO. 60736

Environmental Protection Agency, Cincinnati, Ohio, Office of Research and Development

ENVIRONMENTAL TOXICOLOGY RESEARCH LABORATORY. In: Environmental Research in 1973. Annual Report. National Environmental Research Center,

Cincinnati, Ohio. Environmental Protection Agency-670/9-74-001, p. 48-56, Feb. 1974.

Research conducted by the Environmental Toxicology Research Laboratory is described. Animals were exposed to exhaust emissions from gasoline engines equipped with catalytic converters. The catalysts increased particulate matter (mainly hydrated sulfuric acid droplets) and decreased nitrogen oxides, carbon monoxide, and hydrocarbons in the exhausts. The research methodology and experimental equipment used in this experiment are described. Three separate studies were conducted in which unanesthetized animals (dogs, rats, and guinea pigs) were monitored for cardiovascular or respiratory system response during actual pollutant exposure. Rats were exposed via intravenous injection to several toxicologic agents to determine the neurotoxicity index of metals from mobile or stationary sources. The toxicity of automotive emissions and lead and mercury were also studied. The effects of inhalation and intratracheal exposure to test pollutants on lavage-recoverable free cells of the pulmonary tree were studied to determine the pulmonary cytologic defense system. Dermal irritancy and cellular toxicity testing was studied with palladium, platinum, lead, and manganese on the skin of rabbits. Pharmacologic metabolism was studied in studies of microsomal enzyme effects of auto exhaust, biotransformation of manganese fuel additive, acute toxicity studies with palladium chloride, and protein binding studies. The pathological and biochemical effects of pollutants were studied during experiments regarding methylcyclopentadienyl manganese tricarbonyl, environmental lead, mercury, and nitrogen dioxide, and platinum and palladium from catalytic converter components.

38508

APTIC NO. 61519

AIR POLLUTION AND RESPIRATORY DISEASES. (Taiki oson to kokyuki shikkan). Text in Japanese. Hokenfu Zaishi (Japan. J. Pub. Health Nurse), 30(1):72-74, Jan. 1974. 5 refs.

The present state of patients officially recognized as victims of air pollution with respiratory diseases such as chronic bronchitis, bronchial asthma, pulmonary emphysema, and asthmatic bronchitis, their age distribution, causes of death, and various epidemiological investigations are discussed. The frequency of asthmatic bronchitis was highest in 10 major industrial cities. There were two peaks in patient age—younger than 12 and older than 50 for cases of chronic bronchitis and bronchial asthma. The highest mortality was from respiratory disease, followed by heart disease and then by cancer. Obstructive diseases were more numerous in polluted than in unpolluted areas. One unsolved problem is the wide distribution of less concentrated pollutants as a result of erection of higher stacks to counter localized pollution. Another unsolved problem is the increase of minor symptoms (cough, sputum, length colds) in seemingly healthy people.

173

38509

APTIC NO. 60478

Albahary, C. and C. Boudene

INFRACLINICAL EFFECTS OF LEAD AND THEIR CORRELATIONS WITH THE CONTAMINATION OF THE ENVIRONMENT. (Effets infra-cliniques du plomb et leurs correlations avec l'impregnation de l'environnement). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 667-674, May 1973. 13 refs. (Oct. 2-6.)

A survey of the different biological tests and some tissue degradations resulting from the subclinical effects of lead in the human body is given. Their comparative values are discussed in the context of public health surveys. There harm-

ful conditions must be fulfilled simultaneously in order to cause alarm: protoporphyrin greater than 60 micrograms/100 ml of red corpuscles; delta-aminolevulinic acid dehydratase activity reduced by more than 50%; and blood Pb greater than 40 micrograms/100 ml. It is understood that monitoring the Pb content of the biosphere cannot in itself be sufficient. Steps should be taken in the public interest to restrict this content to a daily average of 8 micrograms/cu m of air. Further research will show whether a reasonable correlation exists between the three points mentioned above and this atmospheric content figure.

38510

APTIC NO. 60472

Azar, A., R. D. Snee, and K. Habibi

RELATIONSHIP OF COMMUNITY LEVELS OF AIR LEAD AND INDICES OF LEAD ABSORPTION. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., 1972, EUR 5004 d-e-f, p. 581-594, May 1973. 13 refs. (Oct. 2-6.)

Using personal air sampling equipment, the correlation between levels of atmospheric lead found in community air and indices of Pb absorption such as blood Pb, urine Pb, delta-aminolevulinic acid, and delta-aminolevulinic acid dehydratase activity were studied in five groups representing a total of 150 individuals. The air Pb exposure of these individuals was measured continuously, 24 hr/day, for periods of time, ranging from 2 to 4 wk. During this time, blood and urine specimens were obtained for the analyses indicated. The relationship between air Pb exposure and indices of Pb absorption is discussed. The subjects were taxicab drivers from Philadelphia and Los Angeles and nonoccupationally exposed groups from Starke, Fla., Barksdale, Wis., and Los Angeles. For all subjects, air Pb exposures were a maximum of 9.12 micrograms/cu m; blood Pb concentrations were below 40 micrograms/100 g for 149 individual -- for the one individual with blood Pb over this amount, this was attributed to factors other than air Pb exposure.

38511

APTIC NO. 60479

Barltrop, D.

SOURCES AND SIGNIFICANCE OF ENVIRONMENTAL LEAD FOR CHILDREN. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 675-681, May 1973. 8 refs. (Oct. 2-6.)

The potential sources of lead in a child's environment are reviewed including food, air, water, paint, glazed vessels, batteries, soils and dusts, industrial clothing which give potential intakes of 135, 6, 15, 1000, 700, 1000, 500, and 500 micrograms/day, respectively. Permissible intakes of Pb should take account of the metabolic and nutritional requirements of different age groups. The permitted Pb content of foodstuffs should be based on the needs of young children rather than adults. The Pb content of paints and soils may make substantial contributions to intake compared with air, water, and foodstuffs. The priorities for environmental control measures should be revised to take account of the major sources of Pb for children with respect to distribution and frequency with which they are associated with symptomatic Pb poisoning. (Author summary modified)

38512

APTIC NO. 60466

Barry, P. S. I.

A COMPARISON OF LEAD CONCENTRATIONS IN HUMAN BONES AND SOFT TISSUES. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 415-426, May 1973. 4 refs. (Oct. 2-6.)

Lead concentrations in bones are compared by ash weight and wet weight. The petrous temporal bone contains the highest concentration of Pb, and female adults contain 35-40% less than males. Children contain lower concentrations of Pb than adults. Bone Pb concentrations increase with age, but the concentrations in the majority of soft tissues do not alter after the first decade. Occupational exposure to Pb results in a three-fold increase in bone Pb concentrations, but no comparable increase is noted in the majority of the soft tissues. Lead retained in bone appears to be virtually unavailable to soft tissues. (Author summary)

38513

APTIC NO. 60491

Barth, D. S., C. Boudene, K. Bridbord, J. R. Goldsmith, S. Hernberg, H. Valentin, M. K. Williams, and R. L. Zielhuis
EVALUATION OF CURRENT DATA TO ASSESS THE HEALTH HAZARDS OF LEAD. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 887, 893-896, 903-938, May 1973. (Oct. 2-6.)

A round table discussion on the evaluation of current data to assess the health hazards of lead is presented. The effects of occupational, industrial, and urban exposures of Pb are discussed. The evaluation of scientific data on Pb effects is discussed. Effects on children, women, smokers and non-smokers and other persons are mentioned. Mortality, morbidity, epidemiology, Pb from automobile exhaust, and other factors are discussed.

38514

APTIC NO. 60469

Beck, E. G., N. Manojlovic, and A. B. Fischer

THE CYTOTOXICITY OF LEAD. (Die Zytotoxizität von Blei). Text in German. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 451-462, May 1973. 15 refs. (Oct. 2-6.)

Lead and airborne dust have a toxic effect on line L cells, manifested by division inhibition and disturbance of cell permeability and intermediary metabolism. The reproduction of connective tissue cells in the human fetus is also impaired. The alveolar macrophages of guinea pigs react to Pb in two different ways: on the one hand there is the rapid lysis of the cell, on the other, slower bullate vacuolation. The latter is caused both by Pb and airborne dust and is comparable in alveolar macrophages, line L cells, and connective tissue cells in the human fetus. Treatment of lead oxide and airborne Pb with a chelating agent (calcium-EDTA) decreases their toxic effect. Lead compounds after aqueous extraction, or their aqueous extracts, have a toxic effect which varies according to the type of compound. Lead in the atmosphere may be regarded as a pathogenic factor in multi-causal etiology of various illnesses.

38515

APTIC NO. 60470

Beritic, T., D. Prpic-Majic, Z. Grgic, and E. Kersanc

ALAD ACTIVITY AND THE RETICULOCYTE COUNT IN LEAD EXPOSURE, LEAD POISONING AND HEMOLYTIC ANEMIA. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 545-550, May 1973. 6 refs. (Oct. 2-6.)

The clinical significance of the reticulocyte count at different delta-aminolevulinic acid dehydratase (ALAD) activity levels was studied in subjects with a low, medium, and high lead risk, in patients with overt Pb poisoning, and in patients with hemolytic anemia. The means for the Pb blood levels for the exposed groups were 10.5, 38.3, and 55.5 micrograms/100 ml, respectively, and the mean for Pb poisoned patients was 113.5

micrograms/100 ml. The means for the reticulocyte count for the exposed groups were 16.7%, 16.8%, and 20.3%, for Pb poisoned patients 86.2%, and for patients with hemolytic anemia 75.8%. The means of the ALAD activities for the exposed groups were 69.3, 13.2, and 5.5 units, respectively, for Pb intoxicated patients 7.1 units, and for the patients with hemolytic anemia 253.4. The relationship between the values of reticulocyte count and of the ALAD activity and the possible practical implications of these findings are briefly discussed. (Author summary modified)

38516

APTIC NO. 60500

Berlin, A., P. Del Castilho, and J. Smeets

EUROPEAN INTERCOMPARISON PROGRAMMES. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1033-1049, May 1973. 13 refs. (Oct. 2-6.)

Four intercomparison programs were initiated in order to determine to what extent the various biochemical tests used to evaluate human exposure to environmental lead give comparable results when performed by different laboratories and to determine if the several Pb air sampling techniques and analytical methods employed in the European Community give the same results concerning the measured atmospheric Pb concentrations. The results of 40 laboratories are compared for determinations of particulate Pb in air, delta-aminolevulinic acid in urine, Pb in blood, and delta-aminolevulinic acid dehydratase in blood. A discussion is also presented. (Author summary modified)

38517

APTIC NO. 61508

Bittersohl, G.

THE EPIDEMIOLOGY OF MALIGNANT GROWTHS OF THE RESPIRATORY ORGANS. (Zur Epidemiologie der boesartigen Neubildungen der Atemorgane). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 19(12):865-869, 1973. 44 refs.

The results of epidemiological studies of cancer of the bronchi, pleura, and lungs in the industrial town of Merseburg are presented. The town has a large chemical industry, soft coal mining and processing industry, and an extensive sector of agricultural production. The studies were based on lung x-rays taken of the population during 1967 to 1971 in hospitals and local health centers. A much higher than average rate of malignant growths of the bronchi, lungs, and pleura per 100,000 of the population of Merseburg. A striking difference of the tumor growth rate was found between males and females. The index of female to male patients for the GDR is 1 to 9.2, for Merseburg 1 to 12.6. This difference is even more striking because the conditions of air pollution are the same for both sexes. Obviously hormonal differences between the sexes play a much greater role than has originally been thought. In those cases where an occupational exposure to carcinogens could be confirmed, asbestos alone or in connection with a second substance such as coal gas, tar products, or ammonia played a much greater role in carcinogenesis than all other known carcinogenic substances.

38518

APTIC NO. 60461

Bruaux, P.

METABOLISM OF LEAD IN ANIMALS-POSSIBILITIES OF THE APPLICATION OF THE RESULTS TO THE HUMAN ORGANISM. (Metabolisme du plomb chez les animaux-possibilités d'utilisation des résultats pour l'homme). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 271-286, May 1973. 59 refs. (Oct. 2-6.)

Studies on the intake, resorption, metabolism, and excretion of lead in animal and human organisms, and on the applicability of related findings from animal tests to the human organism are reviewed. The main correlations between Pb metabolisms in animals and humans appear to be of a qualitative rather than of a quantitative order. Resorption via the gastrointestinal tract, amounting to about 10% of the resorbed quantity in both humans and animals, takes place more readily at an early age. A calcium-deficient diet increases the resorption via the gastrointestinal tract. Both individual and species-specific differences in the gastrointestinal resorption of Pb were evidenced in animals. The retention of Pb particles along the respiratory tract is dependent on such factors as the diameter and density of the particles, the hygroscopic nature of the particles, the rhythm and intensity of respiration, and the duration of the exposure. The deposition of Pb particles in the respiratory tract is possible by impaction in the nasopharynx and the larynx, by sedimentation in lower sections of the respiratory tract, and, for the smallest particles, by brownian motion. Particles with diameters of 5 microns or less can penetrate to the bronchioles and to the alveolar canals, while particles of 0.6 micron or less in diameter reach the alveoli. Some 30% of the Pb particles reaching the alveoli are resorbed. Lead intake via the respiratory tract is much higher than that via the gastrointestinal tract.

38519

APTIC NO. 60460

Bruch, J., A. Brockhaus, and W. Dehnen

ELECTRON MICROSCOPIC OBSERVATIONS OF RAT LUNGS FOLLOWING EXPOSURE TO PARTICULATE LEAD. (Elektronenmikroskopische Beobachtungen an Rattenlungen nach Exposition mit partikelförmigem Blei). Text in German. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 221-230, May 1973. 4 refs. (Oct. 2-6.)

Rats inhaled particulate lead oxide in a concentration of 200 micrograms/cu m. After 14 days exposure, electron microscopic examination of the lungs showed damage to the alveolar macrophages and type I pneumocytes. The changes which took place in terms of ultrastructural criteria were in particular the structures of the mitochondria and the endoplasmic reticulum. Biochemically speaking, a considerable loss in activity of the benzopyrene hydroxylating enzyme in the alveolar macrophages was measured. In type I pneumocytes, mitochondria changes were also observed. Moreover, an increase in lipofuscin granules was observed in these cells. Alveolar macrophage function was reduced by the incorporated Pb.

38520

APTIC NO. 60474

Chalabreysse, J., M. Archimbaud, F. Teulon, and C. Simeon

CONTRIBUTION TO THE STUDY OF HYGIENIC PROBLEMS RELATED TO LEAD: CONCLUSIONS DRAWN FROM INDUSTRIAL HYGIENE AND FROM ENVIRONMENTAL PROTECTION. (Contribution à l'étude des problèmes sanitaires posés par le plomb: enseignements tirés de l'hygiène industrielle et du contrôle de l'environnement). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 603-616, May 1973. 4 refs. (Oct. 2-6.)

Lead concentrations in the air and in plants growing along a busy highway, as well as Pb concentration in a Pb mine, in dust filters in dust masks, were determined, and blood and urine samples from Pb miners were analyzed for Pb contents and for biological changes. Incinerated samples of plants growing near a busy highway contained 40 to 2170 ppm Pb. Low traffic density and abundant precipitation reduced the Pb contents to 10-58 ppm. Air samples taken on both sides of the

highway contained 2.06 and 2.36 micrograms/cu m of Pb. Lead concentrations of 60-1450 micrograms/cu m were measured in a Pb mine, and filters used in dust masks in the same mine contained 150 to 2700 micrograms of Pb depending on the duration of use. Analyses of blood and urine samples from Pb miners revealed Pb contents of 140-850 micrograms/l in the blood, 40-180 micrograms/l in the urine, urine coproporphyrin levels of 35.9-513.9 micrograms/l, delta-aminolevulinic acid levels of 0.24-4.26 micrograms/l, and hemoglobin levels of 11.8-17.2 g/100 ml.

38521

APTIC NO. 60457

Cole, J. F. and D. R. Lynam

ILZRO'S RESEARCH TO DEFINE LEAD'S IMPACT ON MAN. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 169-183, May 1973. 21 refs. (Oct. 2-6.)

The International Lead Zinc Research Organization (ILZRO) sponsored a comprehensive program of research on the environmental health aspects of lead, including studies of the character and concentrations of atmospheric Pb and of the environmental Pb impact on public health. Specific emphasis was on determining the dynamics of absorption of Pb by man and animals from the environment and on assessing the biological impact of exposure to Pb. Although man's activities have caused a generalized ecologic translocation of Pb, the detrimental effects to health are caused only by exposure to Pb far in excess of the concentrations to which the public is continuously exposed. One study determined the size distribution of Pb aerosols at various U. S. cities. Other studies determined Pb in crops and water. Subcellular and cellular, tissue, blood, delta-aminolevulinic acid dehydratase, and other toxic effects of Pb which have been studied are reviewed. (Author summary modified)

38522

APTIC NO. 60489

Devoto, G. and A. Spinazzola

THE EFFECTS OF THE PRESENCE OF LEAD IN THE AIR, WATER, AND FOODS ON ITS RATE OF ABSORPTION IN DIFFERENT TYPES OF SUBJECTS. (L'effet de la présence du plomb dans l'air, dans l'eau et les denrées alimentaires sur son taux d'absorption chez différentes catégories de personnes). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 859-867, May 1973. 15 refs. (Oct. 2-6.)

The effect of the lead levels in the air, water, and food on the blood and urine Pb levels were studied in four groups of 25 to 40-year-old subjects with different degrees of exposure to Pb in Italy. One group living in a small village with very low traffic density was exposed to atmospheric Pb concentrations of up to 0.9 micrograms/cu m, while another group of city dwellers in Cagliari, traffic policemen, and foundry workers were exposed to concentrations of 0.2-14.4 micrograms/cu m, averaging 2.62 micrograms/cu m; 3.26-14.4 micrograms/cu m (average 9.02 micrograms/cu m), and 20-180 micrograms/cu m (average 110 micrograms/cu m), respectively. The Pb concentrations in drinking water and foodstuffs ingested by all four groups were in the respective ranges of 2-12 micrograms/liter and 460-480 micrograms/day. The mean values of the blood Pb levels in the rural dwellers, city dwellers, traffic policemen, and foundry workers were 19.56 + or - 6.66 micrograms%, 21.18 + or - 7.17 microgram%, 27.70 + or - 7.42 microgram%, and 73.84 + or - 22.15 microgram%. The Pb levels in urine samples taken from the subjects in the four groups averaged 21.96 + or - 11.01 micrograms/24 hr, 25 + or - 8.66 micrograms/24 hr, 34.33 + or - 9.53 micrograms/24 hr, and 131.66 + or - 54.55 micrograms/24 hr, respectively. The highly different

Pb levels in the blood and urine of the groups tested are directly dependent of the Pb concentrations measured in the atmosphere of the areas where they live and work.

38523

APTIC NO. 60463

Di Ferrante, E. and P. Bourdeau

METABOLISM AND DISTRIBUTION OF RADIOACTIVE AND STABLE LEAD IN MAN. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 357-363, May 1973. 33 refs. (Oct. 2-6.)

The literature concerning the metabolism and distribution of radioactive and stable lead in animal and human organisms is reviewed. Body burden, retention, and excretion of radioactive and stable Pb are discussed. The data are summarized in tables so that a comparison between results obtained using either radioisotopes of Pb or stable Pb can be made. The purpose of such a comparison is to ascertain whether the information obtained with radiolead can clarify the metabolic processes of stable Pb in man. The usefulness of experiments performed with radioactive tracers is unquestionable; the results of studies on the retention and excretion of radiolead in animals and humans are, in general, confirmed by direct observations made on the behavior of stable Pb in man. Some inconsistencies might be due to differences in the experimental conditions. However, the critical examination of the literature on both radioactive and stable Pb reveals that the mechanism of Pb absorption in man is not completely known. Precise information, for instance, on transfer coefficients of Pb through the respiratory and gastro-intestinal tracts is not reported in the literature. The analysis of the various studies on Pb metabolism has shown where additional research is required. Some specific points to be clarified, also through experiments with radiolead, are suggested. (Author summary modified)

38524

APTIC NO. 60449

Dinman, B. D.

AIRBORNE LEAD IN PERSPECTIVE. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 45-57, May 1973. 1 ref. (Oct. 2-6.)

The extent of environmental pollution with airborne lead, the effects of Pb on man, sources of environmental Pb, and the significance of environmental Pb to other life-forms are discussed. No definitive health hazards can presently be ascribed to ambient atmospheric Pb burdens; thus, potential hazards are considered within the perspective of known clinical and subclinical responses. The major source of atmospheric Pb derives from lead alkyls in gasoline; such urban air contains approximately 20-fold more lead than rural regions. Despite rapidly increasing consumption, present dispersal patterns apparently have prevented recent increments in urban atmospheric Pb. Potential hazards of atmospheric Pb devolve upon children and a few occupations. Airborne Pb fallout in street dirt plus Pb paint pica can impose considerable risk on children. Although work in high vehicular densities may increase blood Pb, such increment is believed to be insufficient to precipitate Pb poisoning. The extreme sensitivity of delta-aminolevulinic acid dehydratase to Pb intake presents a poorly defined risk to heme metabolism requiring more research. Potential brain damage at high levels engenders questions regarding possible subtle effects on neurologic and other organ functions with low level protracted dosing. Total body Pb appears to increase with age. Although largely in bones, potential metabolic hazards to soft tissue (as well as bone) metabolism require investigation. (Author summary modified)

38525

APTIC NO. 61297

Einbrodt, Hans Joachim

POSSIBLE BIOLOGICAL DAMAGES BY THE CARBON MODIFICATIONS COKE AND GRAPHITE. (Zur biologischen Schädigungsmöglichkeit durch die Kohlenstoffmodifikationen: Koks und Graphit). Text in German. Staub, Reinhaltung Luft, 33(12):474-478, 1973. 45 refs.

No maximum allowable emission and immission concentration for coke and graphite exists yet in Germany. A review of cases of lung damages due to inhalation of substances described in literature lead to the conclusion that the emission of coke and graphite should not remain unlimited. A limitation similar to that of inert dusts is recommended since changes of the lung tissue, particularly if preliminarily damaged, cannot be ruled out at present.

38526

APTIC NO. 60686

Fulkerson, William and H. E. Goeller (eds.)

CADMIUM. THE DISSIPATED ELEMENT. Atomic Energy Commission, Oak Ridge, Tenn., Oak Ridge National Lab., National Science Foundation Interagency Agreement AAA-R-4-79, ORNL NSF-Environmental Program Rept. 21, 488p., Jan. 1973. 515 refs.

NTIS: ORNL-NSF-EP-21

A resource analysis of the cadmium (zinc) system is presented in which the following areas are considered: the properties of the elements, especially as these dictate use patterns, movement and measurement in the environment, and biological behavior; the flow in society including the identification of pollution sources and their characteristics and abatement practices; normal and polluted levels of Cd and Zn in air, water, and food and estimated human dose rate ranges; the toxicology of Cd especially relative to itai-itai disease, hypertension, and other cardiovascular ailments; the movement and effects of Cd in ecosystems as studied in the vicinity of large industrial sources or in laboratory soil uptake, food chain, and toxicology investigations; costs to the Zn industry of Cd pollution abatement or Cd use restrictions and the costs to society of potential damages from Cd pollution; government regulations and industrial and environmental standards concerning Cd, methods of control (emission standards and use restrictions, emission charges or taxes, and legal liability); and recommendations for needed research. (Author abstract modified)

38527

APTIC NO. 61288

Gaultier, C., Y. Allaire, and F. Girard

THE SIGNIFICANCE OF THE PULMONARY TOTAL RESISTANCE FOR THE ASSESSMENT OF AIRWAY OBSTRUCTION IN CHILDREN. (Interet de la mesure de la resistance pulmonaire totale pour apprecier la liberte des voies aerienues). Text in French. Arch. Fr. Pediat., 30(7):685-697, 1973. 28 refs.

The significance of direct measurement of the total pulmonary resistance to air flow in the assessment of the airway obstruction in healthy and asthmatic children is presented. The total pulmonary resistance is an inverse function of height, and this relation must be considered when comparing healthy and sick children. A comparison of the total pulmonary resistance and the forced expiratory volume/sec methods in children with spontaneous and acetylcholine-induced asthma and bronchial spasms revealed that the measurement of the pulmonary total resistance was more sensitive and reliable than the latter. It is possible to determine the forced expiratory volume/sec from the pulmonary total resistance for asthmatic children.

38528

APTIC NO. 61178

Grandjean, P. and B. Holma

A HISTORY OF LEAD RETENTION IN THE DANISH POPULATION. Environ. Physiol. Biochem., 3(6):268-273, 1973. 15 refs.

An attempt to evaluate the retention of lead in the Danish population for different time periods of history was made by applying atomic absorption spectrophotometry to the determination of lead content in human bones from periods between the Stone Age (after 4000 B.C.) and 1711 A.D. as well as in macerated bones from the 1940's and samples of fresh vertebrae from autopsies. A lead content of two to 10 times the natural level in accordance with the usage of lead-containing materials for the period was observed in 56 vertebrae from the Middle Ages; and in 48 bones from Copenhagen people, who died during the plague in 1711, a lead concentration was found which was more than 20 times the natural level (median of 6.8 micrograms/g dry weight), a clear indication of the increased lead intake at that time. A positive correlation between the lead concentration in the bones and the concentration in the earth in which the bones were buried was demonstrated, though the correlation was not a simple one and could not be explained by exchange of lead between bones and earth. The lead content of 13 vertebrae from the 1940's was high; whereas the lead concentration in 111 bone samples from individuals who had died suddenly and were older than 14 years in 1972 was only about five times greater than normal. (Author abstract modified)

38529

APTIC NO. 60480

Graovac-Leposavic, L., D. Djuric, V. Valjarevic, H. Senicar, L. Senicar, S. Milic, and V. Delic

ENVIRONMENTAL LEAD CONTAMINATION OF MEZA VALLEY STUDY ON LEAD EXPOSURE OF POPULATION. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 685-705, May 1973. 9 refs. (Oct. 2-6.)

A lead smelter at the lead-zinc mine Mezica caused considerable Pb contamination of the air, water, soil, plants, and food in the area. Persons who had delta-aminolevulinic acid (ALA) values of over 10 mg/l were tested for ALA, coproporphyrin, uroporphyrin, porphobilinogen, and Pb in urine and for ALA-dehydratase, Pb, hemoglobin, erythrocytes, reticulocytes, and red stippled cells in blood. Lead body burden was determined by analysis of Pb excretion after calcium-EDTA injection. The same procedures were performed on controls from a noncontaminated area. A detailed questionnaire was completed on each person to determine the morbidity. Data was evaluated for children versus adults and men versus women. The Pb body burden in exposed persons was up to 10 times higher than in unexposed. In 15 randomly selected persons, 13 showed some chromosome aberrations in the lymphocytes of the blood, which seem to be characteristic for Pb effects. No clinical signs of the toxic effects of Pb were found. The most impressive changes were on the enzyme system of porphyrin biosynthesis, chromosome aberrations, and Pb body burden.

38530

APTIC NO. 60447

Greenfield, S. M., K. Bridbord, D. Barth, and R. Engel

THE CHANGING PERSPECTIVES REGARDING LEAD AS AN ENVIRONMENTAL POLLUTANT. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc. Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 19-26, May 1973. 31 refs. (Oct. 2-6.)

The Environmental Protection Agency's thoughts on lead toxicity are described. Cases of Pb poisoning have been reported in children with blood Pb levels in the 40-50 micrograms/100 g range. While this level is indicative of excessive Pb exposure in most children, the upper acceptable normal blood Pb level should probably be somewhere below 40 micrograms/100 g for children. Infant and fetus umbilical cord blood levels should be less than 30 micrograms/100 g. The potential contribution of air Pb exposures to blood Pb in the general population is a significant

issue of debate within the scientific community. Several studies are reviewed which give conflicting results. These studies generally indicate that exposures to elevated airborne Pb levels can increase human blood Pb levels. Lead contaminated dirt, dust, and air cannot be ignored as significant contributing causes to Pb poisoning in children, even in those who eat Pb-based paint. Children may ingest Pb-contaminated dusts or soils. Blood Pb must thus be viewed as a function of all exposure routes. Although average blood levels among urban adult populations in the U. S. are well within normal limits, considerable numbers of individual urban residents have blood Pb levels exceeding 40 micrograms/100 g. About 1-2% of adult females and 3-5% of adult males in urban areas have abnormally elevated blood Pb levels. In selected sub-groups such as garage mechanics and parking attendants, this proportion is markedly higher, approaching 50% or more. Approximately 1/4th of the children surveyed had elevated blood Pb levels of 40 micrograms/100 g and above. Excessive Pb exposure may also be occurring before birth to babies born in urban environments. The general impact of the findings suggest that airborne Pb is contributing to excessive Pb exposures among the general urban population of the U. S.

38531

APTIC NO. 60830

Griffin, Travis B., Frederick Coulston, Leon Golberg, Henry Wills, James C. Russell, and John H. Knelson

CLINICAL STUDIES ON MEN CONTINUOUSLY EXPOSED TO AIRBORNE PARTICULATE LEAD. Preprint, Albany Medical College, Albany, N. Y., Inst. of Comparative and Human Toxicology and Environmental Protection Agency, Chapel Hill, N. C., Clinical Environmental Research Labs., 1973 (?), 15 refs.

Male volunteers were exposed 23 hr/day for about 18 wk to airborne lead concentrations of either 10.9 micrograms/cu m or 3.2 micrograms/cu m of air in an attempt to determine the extent to which exposure would elicit an increase in body burden of the metal and whether blood-lead would continue to increase throughout exposure or reach a stabilized concentration. Exposure to both concentrations of particulate lead resulted in a measurable increment in blood-lead; and in both cases the blood-lead level reached a plateau concentration which reflected the level of exposure in a dose-related fashion. An unequivocal increase in urinary excretion of lead followed exposure to 10.9 micrograms/cu m but was variable following exposure to 3.2 micrograms/cu m. The activity of delta-aminolevulinic acid dehydratase in erythrocytes decreased significantly during exposure to the higher concentration but not during exposure to the lower; the decreased enzyme activity did not alter the rate of excretion of heme precursors. Neither level of lead exposure elicited any signs or symptoms of lead intoxication in the adult males.

38532

APTIC NO. 60482

Haas, T., K. Mache, K. Schaller, A. Wieck, W. Mache, and H. Valentin

STUDIES ON THE ECOLOGICAL LEAD LOAD IN INFANTS. (Untersuchungen ueber die oekologische Bleibelastung im Kindesalter). Text in German. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, 741-748, May 1973. 14 refs. (Oct. 2-6.)

Studies on the dynamics of the lead concentrations in the blood of infants and children are described. The mean blood lead level determined in the umbilical cord was 15.0 + or - 7.9 micrograms%, i.e., significantly lower than that of the mothers (16.9 + or - 8.6 micrograms%). The lead level in the umbilical cord blood was dependent on the blood lead concentration of the mother. The blood lead level was, although statistically not significantly, lower in mothers from the countryside than in those living in cities. Another investigation of 363 children aged 8 days to 8 yr showed the blood lead level to be

distinctly dependent on the age, due to permanent exposure to blood in foods and in the air. From an average level of $3.3 \pm$ or -2.6 micrograms% in the first year of life, blood levels reached $11.5 \pm$ or -4.9 micrograms% at the beginning of school age. The delta-aminolevulinic acid dehydratase activity in 68 infants and young children aged between 8 days and 3 yrs averaged $855 \pm$ or -306 micromol PBG/h/l Ery, statistically not different from that in normal adults. The delta-aminolevulinic acid excretion was unsuitable as an index of the biological effects of lead.

38533

APTIC NO. 60475

Hernberg, S.

BIOLOGICAL EFFECTS OF LOW LEAD DOSES. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 617-629, May 1973. 16 refs. (Oct. 2-6.)

As the total environment of man becomes more polluted with lead, methods are needed for assessing Pb effects in various organ systems. The most sensitive indicator known is inactivation of erythrocyte delta-aminolevulinic acid dehydratase, measurable even at present levels of exposure in the urban environment. Subclinical nervous damage and psychological disturbances have been demonstrated in clinically symptomless subjects; however, they require higher levels of exposure than those causing depression of ALA-D activity. The same is probably true for the chromosomal aberrations found in symptomless Pb workers. A common feature for all these findings is that they may force the reconsideration of the threshold concept. This question is of primarily theoretical interest. For practical purposes, it is much more important to reach agreement on what qualities and quantities of responses are unacceptable in terms of health. These considerations must also take into account the normal interindividual variation, with regard to accumulation and to response. Agreement on how broad safety margins should be applied is another important task. (Author summary modified)

38534

APTIC NO. 60358

Hirai, K., M. Tokuda, E. Hirano, M. Fujii, T. Nishimura, T. Kurita, M. Takashima, and O. Tomibe

EFFECTS OF AIR POLLUTION ON CHILDREN IN KYOTO CITY, PART I. ON THE DEGERMINATION OF THE DEGREE OF AIR POLLUTION AND THE HEALTH INVESTIGATION OF CHILDREN IN 1970 AND 1971. (Kyoto-shi ni okeru taiki osen no jido ni oyobusu eikyo, dai I-po- arukari roshi-ho ni yoru taiki osen nodo no sokutei to jido no kenko chosa ni tsuite(showa 45 nendo oyobi 46 nendo)). Text in Japanese. *Nippon Koshu Eisei Zasshi (Japan J. Public Health)*, 20(12): 713-720, Dec. 1973. 8 refs.

The concentration of sulfur trioxide and nitrogen dioxide and the volume of traffic were measured near a number of primary schools in Kyoto. Schoolchildren were investigated by questionnaire, medical examination, and lung function test (peak-flow value). All investigations were carried out both in 1970 and 1971. The values for SO₂ were 0.23 and 0.22 mg/day/100 sq cm in 1970 and 0.28 and 0.16 mg/day/100 sq cm in 1971. The values for NO₂ were 0.050 and 0.037 mg/day/sq cm in 1970 and 0.071 and 0.036 mg/day/sq cm in 1971. Traffic volume fluctuated between 6 and 3303 cars/10 min. The morbidity of subjective asthmatic symptoms was 6.57% in 1970 and 7.87% in 1971. The 1970 examination of peak flow in affected children showed about 50% having a higher value than the standard value, while in 1971 63.7% had a higher value than the standard. In spite of the decrease in SO₂ concentration, the morbidity increased, suggesting the existence of other air pollutants.

38535

APTIC NO. 60361

Hirota, Y. and H. Kawanuma

A STUDY ON THE PRESENT STATE OF AIR POLLUTION IN A LIVING ENVIRONMENT OF A COLLECTIVE HOUSING AROUND A ROAD OF HEAVY TRAFFIC. (Hanbo doro shuben danchi kyoju kankyo no kuki osen no jittai ni kansuru kenkyu). Text in Japanese. *Koshu Eisei Joho (Public Health Inform.)*, 3(11):22, Nov. 1973.

To investigate the effects of roadway air pollution on the environment, the concentration of pollutants and the effects on the schoolchildren were measured at a school near a roadway. The amount of traffic was 4000 cars/hr, and roadway pollutants were carbon monoxide 8-9 ppm, dust 0.1-0.2 mg/cu m, and lead 2-5 micrograms. In the school, dust was 0.05-0.1 mg/cu m outside, 0.04-0.09 mg/cu m inside, CO was 3.2-3.5 ppm outside, and 3-5 ppm inside, and no Pb was detected. The concentration of CO in children's expired air was 5.4-5.6 ppm and carboxyhemoglobin in the blood was 1.3-1.6%. The Pb content in the urine and the amount of aminolevulinic acid excreted were in the normal range.

38536

APTIC NO. 60477

Hoegger, D.

THE HYGIENIC SIGNIFICANCE OF LEAD IN GASOLINE. (Die hygienische Bedeutung der Benzinverbleiung). Text in German. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., 1972, EUR 5004 d-e-f, p. 655-666, May 1973. 4 refs. (Oct. 2-6.)

Since 1948, regular tests for lead have been carried out on road and airborne dust in various places in Switzerland, and recently there have also been checks on the contamination of roadside vegetation. The Pb content of road dust has for a fairly long time been between 1 and 2%, and that in city air during rush hours between 3 and 9 micrograms/cu m. There is considerable Pb contamination of vegetation which is right on the roadside verges (3-100 mg Pb/kg dry weight, according to distance from the verge). Distinct traces of Pb can be detected at distances of more than 100 m. Plant damage specifically attributable to Pb has not been observed, however. The Pb content of milk for human consumption is not particularly high. In addition, tests on various groups of persons (students, metal workers, garage workers, motorists, policemen, residents) established that there were no signs of increased Pb uptake or even Pb damage. Blood Pb, coproporphyrin excretion, and delta-aminolevulinic acid excretion did not increase. The one exception was residents who obtain their vegetables from a garden adjoining a highway. These cases showed slightly higher Pb excretion in the urine compared with control groups. There were no other symptoms. In view of the communicated findings, the Pb contamination to date is not regarded as constituting a hazard. Meanwhile, with regard to the continuous increase in motor traffic, a reduction in the Pb content of gasoline is recommended in order to prevent a further increase in contamination. (Author summary)

38537

APTIC NO. 60003

Hoegger, D.

FUNDAMENTALS OF TOXICOLOGY. (Grundlagen der Toxikologie). Text in German. Bull. Eidgenöss. Gesundheitsamtes, Beilage B, no. 6:384-394, Dec. 1973.

The fundamentals of toxicology, including industrial and environmental toxicology, are presented, and the mechanisms of action in poisoning, as well as factors determining and influencing the effect of poisons, are discussed. For any poison to act in the organism, a certain minimum concentration of the poison should be present in the organism for a given duration. Poisonous substances may enter the organism through the intact or lacerated skin, through the gastrointestinal tract, or, as in the case of air pollutants, through the respiratory tract.

While coarse dust and such gases as sulfur dioxide are retained in the upper respiratory organs, fine respirable dust, carbon monoxide, and benzene vapors penetrate to the lower respiratory organs where they are either deposited (dusts) or absorbed by body fluids. The occurrence of a minimum effective concentration of poisonous substances in the organism is dependent on such factors as the dose absorbed, the form in which the poison is absorbed, the route of incorporation, the rate of incorporation, and the rates of elimination or metabolism. Poisonous substances may exert their damaging effect by damaging organs and tissues (lung, gastrointestinal tract, nervous system, liver, cell walls), blockade or stimulation of enzymes, or mutagenic effects. There is no proportionality between doses and effect, since minute doses have practically no effect, larger doses are counteracted by compensatory mechanism, and only large doses cause damages and even death. The LD50 values represent no valid criterion for environmental toxicology which deals with the chronic effect of small concentrations. While soluble lead compounds are highly toxic, insoluble compounds are hardly toxic. Pure SO₂ and soot alone are relatively harmless, while their combination causes serious chronic bronchitis. Hydrocyanic acid, hydrogen sulfide and CO are hardly toxic when absorbed slowly due to rapid elimination, they may be fatal when absorbed rapidly in high concentrations.

38538

APTIC NO. 60359

Imai, M., H. Oshima, T. Kawagishi, K. Yoshida, and M. Kitabatake

AIR POLLUTION AND ITS EFFECT ON HUMAN BODIES IN YOKKAICHI CITY. (Yokkaichi-shi ni okeru taiki osen to sono jintai eikyo ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 28(3):347-357, Aug. 1973. 12 refs.

In order to find the lowest threshold concentration of air pollutants over which there is an effect on humans the population of Yokkaichi City was investigated. The subjective symptoms of schoolchildren, morbidity of respiratory disease, and the percentage of people undergoing medical examination were analyzed. The most sensitive indices of human effects were morbidity of bronchial asthma in schoolchildren, morbidity of chronic bronchitis in people over 40, and the frequency of examination for these ailments. The morbidity of childhood bronchial asthma increased when the sulfur dioxide concentration was higher than 0.55 mg/day/100 sq m and the frequency of medical examination increased when SO₂ was higher than 0.65 mg/day/100 sq m. Concentrations beyond these thresholds did not lead to further increases, however. The morbidity of older people increased when SO₂ was higher than 0.75 mg/day/100 sq m and the frequency of medical examination increased when the concentration was higher than 0.65 mg/day/sq m. Higher concentration lead to higher figures for morbidity and medical examinations. The lowest threshold that effects human health was 0.55-0.65 mg/day/sq m SO₂.

38539

APTIC NO. 61516

Imai, Masayuki, Hidehiko Oshima, Fukiko Kawagishi, Katsumi Yoshida, and Masayoshi Kitabatake

RELATIONSHIP BETWEEN EPIDEMIOLOGICAL STUDIES AND PUBLIC RELIEF SYSTEM. (Taiki osen no jintai ni oyobosu eikyo ni tsuite - ekigaku to kogai nintei seido). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):464, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 608, 1973, Paper 196.)

Various epidemiological investigations were conducted on the morbidity of respiratory disease to see the effects of abatement programs in Yokkaichi. A questionnaire was given to the pupils of city's elementary schools, and the citizens morbidity was investigated by the receipts of the national health insurance. According to the subjective symptoms of schoolchildren, the lowest threshold for any physical effects from sulfur

AIR POLLUTION ABSTRACTS, AUGUST 1974

dioxide is 0.55-0.65 mg/day, and concentration that clearly affects the human health is more than 0.80 mg/day. At the level of 0.80-0.90 mg/day of SO₂, bronchial asthma morbidity is 3.22%. However, morbidity for asthmatic attacks in Yokkaichi is rapidly improving over the recent years; the rate was approximately 26% in 1964, and it dropped to about 12.5% in 1972. The morbidity of residents above 40 years of age is also gradually decreasing.

38540

APTIC NO. 60406

Joosting, P. E. and J. De Vries

ENVIRONMENTAL LEAD IN THE NETHERLANDS. SECTION B. APPRAISAL OF LEAD EXPOSURE IN CUSTOMS OFFICERS AND POLICEMEN AT A HIGHWAY FRONTIER STATION. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 807-808, 819-833, May 1973. 9 refs. (Oct. 2-6.)

A group of 29 customs officers and 16 policemen were studied for the effects of lead in the atmosphere. Lead in the air and blood, hemoglobin, hematocrit, delta-aminolevulinic acid dehydratase (ALAD) in blood, coproporphyrin in the urine, and delta-aminolevulinic acid in the urine were measured. A greater part of the investigated persons demonstrated the phenomena of increased Pb uptake and decreased ALAD activity.

38541

APTIC NO. 54032

Kagawa, T., T. Toyama, M. Nagasaki, and R. Udo

PHOTOCHEMICAL AIR POLLUTION AND THE LUNG FUNCTION OF PRIMARY SCHOOLCHILDREN. (Shogaku jido no haikyo to kokagaku taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):417, Oct. 1973. (Presented at the Japan. Society for Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973.)

The influence of smog on respiratory functions was investigated by measuring airway resistance according to a body plethysmograph, Vmax at 25% vital capacity from the flow volume curve, and the intra-pulmonary gas mixing index. The increase of nitrogen at the time of expiration at a single oxygen inhalation was investigated. A significant correlation coefficient between the respiratory functions and environmental factors occurred at 0.05, and the Vmax at 25% vital capacity correlated significantly to many environmental factors. The Gaw/Vtg was compared to ozone, and the Vmax at 25% vital capacity was compared to nitric oxide in children who reacted strongly to the correlation between lung function and environmental factors. Atmospheric temperature was strongly influential, and O₃ and NO were affected over certain concentrations. It is not known if the fluctuation of the Vmas and Gaw/Vtg is influenced directly by temperature, O₃ and NO themselves, or some other factors.

38542

APTIC NO. 60408

Kaneko, Y., M. Tautami, T. Hizaki, G. Kasahara, M. Hamada, A. Yokoyama, T. Sakuma, M. Dazai, K. Arai, H. Horiuchi, T. Endo, and S. Sano

AIR POLLUTION AND NASAL DISEASES, PART I: RESULT OF HEALTH EXAMINATION OF SCHOOLCHILDREN IN POLLUTED AREA AND IN UNPOLLUTED AREA. (Taiki osen to hana shikan - dai 1 po-osen chiku to hi osen chiku no gakudo kenko shindan seiseki). Text in Japanese Nihon Jibi-Inkoka Gakkai Kaiho (Jap. J. Otorhinolaryngol. Soc.), 76(10):1160-1161, Oct. 1973.

The morbidities of nasal allergy and sinusitis nasales were determined in schoolchildren from polluted and non-polluted areas by means of detailed mass examination including

questionnaires, rhinoscope examination, allergic intracutaneous examination with allergens, allergen-inducing examination, and x-ray examination. The morbidity of allergic rhinitis in polluted areas was more than twice that in unpolluted areas. The morbidity of nasal allergy among allergic diathetics was 45% in the unpolluted areas and 72-80% in the polluted areas. The morbidity of sinusitis nasales was larger in the polluted city area and smaller in the unpolluted rural areas, a situation which is the reverse of that found 10 yr ago.

38543

APTIC NO. 60467

Karhausen, L.

INTESTINAL LEAD ABSORPTION. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 427-440, May 1973, 41 refs. (Oct. 2-6.)

Lead ingestion, gastrointestinal absorption of Pb, and oral versus respiratory intake of Pb are reviewed. Oral intake of Pb amounts to about 0.44 mg in adults and 0.15 mg in children. The coefficient of intestinal absorption is around 0.08 in adults and 0.25 in children. However, the value for children is questionable and needs confirmation. Absorption in the intestine depends on known factors (chemical form and dietary calcium), and presumably significant factors (vitamin D intake, diet composition, load of Pb, and gastric acidity). Inhaled Pb contributes a significant part to Pb intake. It varies mainly with the atmospheric concentration of Pb, the size of the particles, and some physical factors. Further studies, if necessary, should concentrate on the fractions absorbed and secreted at the different levels of the gastrointestinal tract, on the effect of biological complexants, and ligands in the intestinal lumen, and on the mechanism of transfer through the intestinal wall. (Author summary modified)

38544

APTIC NO. 61555

Kobayashi, Yoshitaka

LEAD IN THE ENVIRONMENT AND ITS EFFECTS ON MAN. PART II. THE EFFECT OF LEAD IN ATMOSPHERE ON PRIMARY SCHOOL BOYS IN KANAGAWA PREFECTURE. (Kankyo-chu no namari to sono jintai eikyo ni kansuru kenkyu - dai 2ho- taiki-chu namari no shogakko jido ni oyobosu eikyo). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 28(4):381-384, Oct. 1973, 12 refs.

Lead, coproporphyrin, and delta-aminolevulinic acid in the urine of two groups of primary schoolchildren, one group consisting of 40 boys in a school located in a rural area in Kanagawa Prefecture and the other group consisting of 40 boys in a school located in downtown Yokosuka city were determined every 2 mo over a period of 12 mo, from Nov. 1970 to Oct. 1971. The results were examined statistically in connection with the atmospheric concentrations measured at the corresponding two points during the same period. Although the concentration of lead in dust fall in the primary school in Yokosuka city was 219 micrograms Pb/sq m/day, being two times larger than that in the school in the rural area of 90 Pb micrograms/sq m/day on the average, levels of lead and coproporphyrin content in the urine of school boys exposed to different conditions did not show any statistically significant differences throughout the year of the study. The total average of lead, coproporphyrin, and delta-aminolevulinic acid of the 80 boys were, respectively 21.6 micrograms/l, 27.3 micrograms/l, and 2.33 mg/l. Only the level of delta-aminolevulinic acid was significantly higher in the urine of boys in the school of Yokosuka City than of those in rural area.

38545

APTIC NO. 61561

Kondo, S. and S. Suzuki

RESULTS OF INVESTIGATION OF ACTUAL SITUATION OF RESPIRATORY DISEASES DUE TO AIR

POLLUTION. (Taiki osen kokyuki shikkan jittai chosa). Text in Japanese. Koshu Eisei Joho (Public Health Inform.), 3(12):19, Dec. 1973.

An investigation of the effects of air pollution on primary schoolchildren was made by clinical examination of 12,268 children in Sakaide, Marugame, Utazu, and Tadotsu in Kagawa prefecture. The investigation entailed measurement of the incidence of bronchial asthma, the conditions of its onset (season and environment), and signs at the onset of asthmatic fit. The clinical examination consisted of chest x-ray, electrocardiogram, and lung function test. Primary investigation uncovered 1055 patients (618 boys and 437 girls), and of these 456 were examined more closely. The number diagnosed as bronchial asthmatics was 123, giving a morbidity of 1%, a figure not different from that found in other prefectures. When rhinitis is included the morbidity becomes 2.3%. More than half of the patients were younger than 3 yr old. Morbidity in Marugame was 2.4%, Tadotsu 2.3%, Sakaide 2.2%, and Utazu 1.4%. Morbidity was also broken down according to type of living area; urban, rural, and seashore. Forty % of all subjects had a hereditary predisposition to asthma. The season of most frequent onset was autumn to winter, and the most frequent time of onset was evening to night. The most frequent weather conditions at onset of bronchial asthma were rainy and cloudy. The exact breakdown of diseases is 123 cases of bronchial asthma, 126 cases of asthmatic bronchitis, 17 cases of bronchitis, 4 cases of allergic rhinitis, 1 case of anemia, and 1 case of psychogenic responses.

38546

APTIC NO. 61213

Kubo, M.

AIR POLLUTION AND BRONCHIAL ASTHMA IN CHILDREN- A SPECIAL LECTURE. (Tokubetsu kosa - Taiki osen to shoni kikanishi zensoku). Text in Japanese. Nihon Shonika Gakkai Zasshi (Soc. Paediatr. Jap.), 77(11):757-767, Nov. 1973.

Health examinations of children in Fuji City, Shizuoka Prefecture were undertaken to examine the relationship between air pollution and respiratory diseases, especially bronchial asthma. The pollutants come from paper mill exhausts and include sulfur oxides, dusts of sodium sulfate, mercaptans, and hydrogen sulfide. The city was divided into three regions according to the concentration of sulfur dioxide; the highly polluted (0.07-0.06 ppm), moderately polluted (0.05 ppm), and slightly polluted (0.03 ppm), and the influence on human health was investigated. The morbidity of schoolchildren's bronchial asthma was 2.34% in the highly polluted region, and 0.8% in the slightly polluted region. In the highly polluted region the age of onset was lower. The frequency of highest occurrence in the highly polluted region was winter. The asthmatic children in the highly polluted regions differed from the other in that their gamma-globulin was lower, bacterial flora in nasopharyngeal cavity was abnormal and pathological, the response to dust was different, rate of remission was low with a tendency to relapse, and there was a significant correlation between the monthly averaged days of asthmatic fits and the monthly averaged concentration of SO₂.

38547

APTIC NO. 60463

Lafuma, J.

APPLICATION OF METABOLIC MODELS DEVELOPED IN RADIOTOXICOLOGY TO INHALED AND INGESTED LEAD. (Comment appliquer au plomb inhale et ingere les modeles metaboliques mis au point en radiotoxicologie). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 313-317, May 1973. (Oct. 2-6.)

The application of models developed in radiotoxicology to the study of relations between routes of entry (gastrointestinal and respiratory tracts) and the polluted environment, and the

metabolic fate of ingested or inhaled lead in the organism is described on the example of a model lung developed by the Lung Dynamics Task Group. The model includes parameters characterizing the deposition of Pb particles with regard to granulometric distribution and density. Depending on granulometry and solubility, the inhaled particle fraction is transferred from the nasopharynx either to the blood, the gastrointestinal tract, or the tracheobronchial tract from which it reaches the lung. Once in the lung, it may be transferred to the gastrointestinal tract or to the blood, either directly or via the lymphatic system. The model is suitable for the determination of the distribution of the given element among the different organs and the different ways of excretion, as well as the retention times in the organs. The use of such models requires the determination of target organs, and of the maximum permissible quantity of Pb in such organs on the basis of dose-effect studies.

38548

APTIC NO. 61554

Maeda, Hiroshi, Junko Sato, Masakazu Nago, Tamenobu Kubota, and Hideyuki Muroya

DETERMINATION OF CO IN BLOOD WITH INFRARED ANALYZER. AN EVALUATION OF THE METHOD OF LAW THER AND AP THORP. (Sekigai-sen bunseikiki ni yoru kecchu CO no teiryō - Lawther and Apthorp-ho no kento). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 28(4):400-405, Oct. 1973. 11 refs.

The accuracy of the Lawther and Apthorp method by a non-dispersion infrared analyzer was studied for use in determining carbon monoxide in the blood, as compared to the standard manometric method of Horvath and Roughton and the spectrophotometric method of Commins and Lawther. The accuracy of the manometric method was inferior to the other two methods. The manometric method was carried out with difficulty in the lower concentration of carbon monoxide, while the spectrophotometric and infrared methods were about equally easy with equal reproducibility. The infrared method gave a linearity in CO concentration from 0 to 100% and the method extracts and determines only the CO which combined to hemoglobin, with a simple procedure and technique. The spectrophotometric method gave a linearity in concentration of CO from 0 to 80 COHb, however, it is necessary to make 100 and 0% COHb solution and to determine the sample at least two or three times. According to these findings, the infrared method of Lawther and Apthorp would be recommended for the determination of blood CO in studies of air pollution.

38549

APTIC NO. 61447

Makino, S. and A. Miyamoto

AIR POLLUTION AND ALLERGY. (Taiki osen to arerugi). Text in Japanese. Jibi Inkoka (Otolaryngol.), 45(10):701-712, Oct. 1973. 36 refs.

The relationship between air pollution and respiratory diseases such as allergies and asthma is reviewed. Epidemiological studies reveal that air pollution tends to induce respiratory symptoms in older persons with allergic dispositions and asthma. Sulfur dioxide and photochemical oxidant levels have been implicated in the onset of asthmatic fits. Other offenders, existing as gases, dusts, and aerosols, include carbon monoxide, sulfur oxides, nitrogen oxides, hydrocarbons, metal powders, pesticides, fluorides, asbestos, radioactive substances, and natural pollutants such as pollen and fungal spores. Experimental animal studies are described. Airway hypersensitivity is discussed in relation to the effect of chemical mediators, allergens, and housedusts. Although air pollution is known to aggravate allergies at the levels of stimulation of airway mucosa, constriction of bronchus, accentuation of airway hypersensitivity, stimulation of antibody production, and increase of airway infection, it is still not known whether it is a causal factor.

38550

APTIC NO. 60973

Melekchina, V. P.

HYGIENIC ASSESSMENT OF THE HYDROGEN ION CONTENT IN THE ATMOSPHERE. (Gigiyenicheskaya otsenka soderzhaniya vodorodnykh ionov v atmosfere vozdukh). Text in Russian. Gigiena i Sanit., no. 3-6-9, 1973. 6 refs.

The effect of different hydrogen ion concentrations in the atmosphere on the albino rat organism was studied. The animals were exposed to hydrochloric acid, sulfuric acid, and nitric acid corresponding to hydrogen ion concentrations of 0.0183; 0.0160, and 0.0170 mg/cu m, respectively, for 84 consecutive days. Two other groups inhaled combinations of these three acids, corresponding to hydrogen ion concentrations of 0.0171 and 0.00542 mg/cu m, respectively. Changes in the ratio of the rheobases of the extensors and flexors; statistically significant decreases in the blood cholinesterase activity of the SH group level; statistically significant increases in the urinary 17-ketosteroid level; decreases of the ascorbic acid level in the spleen, cerebrum, kidney, and adrenal glands; catarrhal bronchitis; peribronchitis; focal pneumonia; emphysema; atelectasis; and fibrosis were observed in all groups except that exposed to a combination of acids corresponding to a hydrogen ion concentration of 0.00542 mg/cu m. In the case of resorptive action the main effect is due to the hydrogen ion concentration rather than to the anions of the corresponding acids.

38551

APTIC NO. 60471

Milic, S., M. Stankovic, V. Delic, and V. Djordjevic

BIOCHEMICAL PARAMETERS IN EVALUATION OF ENVIRONMENTAL LEAD EXPOSURE. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 561-568, May 1973. 20 refs. (Oct. 2-6.)

Inhabitants of the Meza valley living in the vicinity of a lead smelting plant with a low exposure to Pb and subjects of a control group were examined for delta-aminolevulinic acid dehydratase (ALAD) in blood, delta-aminolevulinic acid (ALA), porphobilinogen in urine, coproporphyrin and uroporphyrin in urine, and Pb in urine. The significant reduction of ALAD activity in red blood cells and an increase of ALA level and to some extent Pb, coproporphyrin, and uroporphyrin levels in the urine were evident in the exposed group. The comparison of the results in 1968 and later in 1969 suggests that the levels of ALA in the urine reflect the actual Pb exposure. The investigation established that the activity of ALAD in red blood cells and the determination of ALA in the urine represent very suitable biochemical tests in the control of environmental Pb exposure. (Author summary)

38552

APTIC NO. 54492

Misfeld J. and J. Timm

INVESTIGATIONS ON THE CARCINOGENIC BURDEN BY AIR POLLUTION IN MAN. I. MATHEMATICAL PLANNING OF EXPERIMENTS. Zentralbl. Bakteri., Parasitenk. Infektionskr. Hyg.: Abt. I: Orig., Reihe B, 158(1):4-21, 1973. 11 refs.

In order to arrive eventually at a mathematical model which predicts the cancer risk of a human population due to air pollution in correlation to the concentrations of various compounds of air pollution, attention is focused in a first step towards this goal on the analysis of several hydrocarbons and on animal experiments with automobile exhaust condensate and condensate fractions. The basic scheme of mathematical planning of the experiments is outlined in a table. Special attention is given to the mathematical determination of optimal doses. Results from the literature and preliminary chemical-analytic results permitted the conclusion that automobile ex-

haust condensate is ten times as effective as cigarette smoke condensate and benzo(a)pyrene is 12,000 times as effective as cigarette smoke condensate. Two hypotheses were used for the estimation of optimal dosages. Firstly, it was assumed that for the exhaust condensate to be tested, benzo(a)pyrene explains about 3.8% of the effect and the benzo(a)pyrene-free part shows a relative potency of 0.0008. Processing method employed is briefly outlined.

38553

APTIC NO. 61587

Miyamoto, A.

PATHOPHYSIOLOGY OF RESPIRATORY DISEASES CONCERNING AIR POLLUTION: ON THE FACTORS WHICH ARE TO BE AFFECTED BY AIR POLLUTION. (Byotai; Taiki oson no eikyo o ukeyasui inshi ni tsuite). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), 11(12):718-723, Dec. 1973. 12 refs. (Presented at the Symposium on Air Pollution and Respiratory Diseases, 3rd, and at the Japanese Society of Thoracic Diseases, 8th, April 1973.)

The relationship of air pollution to allergy, airway hypersensitization, alpha 1-antitrypsin, and various respiratory diseases are described. Pollutants can affect a predisposition to allergy and can sensitize the airways. Animals exposed to sulfur dioxide, nitric oxide, and ozone had higher antigen counts than control animals. The deactivation of histaminase and cholinesterase by incubation with O₃ and NO was elucidated in vitro. Air pollution may also affect sputum production, chronic coughing, throat irritation, shortness of breath, and dyspnea. The effects of air pollution on these symptoms were studied on humans. Air pollution can also cause lung cancer.

38554

APTIC NO. 61400

Muir, D. C. F.

INHALED PARTICLES. Br. Thorac. Tuberc. Assoc. Rev., 3(4):65-74, Dec. 1973. 8 refs.

The general behavior of airborne particles in the lung is related to the causation and treatment of disease. Some of the particles which enter the lungs with the tidal air may be exhaled again. However, many are deposited on the surface of the respiratory tract and the amount and site of this deposition is determined by the aerodynamic properties of each particle. The nature of a respiratory tract disease caused by inhaled dust depends on the composition and size of the individual particles. Inhaled particles and disease of the lung can be tabulated as follows: cigarette smoke causes bronchitis and lung cancer; city air pollution causes bronchitis; coal mine dust causes coal workers pneumoconiosis and chronic bronchitis; rock dust (quartz) causes silicosis; staphylococci causes colonization of nose; tubercle bacilli causes primary tuberculosis; grass pollen causes hay fever; fungal spores cause asthma; and fungal spores cause allergic alveolitis and asthma. Experimental work is being conducted on inhaled aerosols particularly on the effect of lung disease of the behavior of the particles and on synergistic physiological effects between particles and gases.

38555

APTIC NO. 60762

Murray, R.

POLLUTION AND HEALTH. Preprint, National Society for Clean Air, Brighton (England), 20p., 1973. (Presented at the National Society for Clean Air, Annual Conference, 40th, Torquay, England, Oct. 15-19, 1973.)

Industrial experience indicates that dust is the most toxic pollutant to humans. Coal dust is primarily responsible for industrial pneumoconiosis. Asbestos is both a community problem and industrial problem because of its wide use and causes the pneumoconiotic condition known as asbestosis. A synergistic effect between exposure to asbestos and smoking reportedly increases the development of lung cancer. Blood and urine examinations can predict early effects of lead on the synthesis of

hemoglobin in the blood, although it is difficult to establish whether such early changes are really evidence of disease. The problem of assessing the relationship of atmospheric pollution to physical health is examined, with specific cases being cited.

38556

APTIC NO. 61387

Nakajima, T.

EFFECTS OF NITROGEN OXIDES ON LIVING BODIES-EXPERIMENTS OF ANIMAL EXPOSURE. (Chisso sankabutsu no seitai eikyo; dobutsu bakuro jakken). Text in Japanese. Taiki Oson Kenkyu (J. Japan. Soc. Air Pollution), 8(3):223-233, Oct. 1973. 38 refs. (Presented at the Japan. Society for Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973.)

The effects of nitric oxide and nitrogen dioxide on the respiratory system and blood chemistry of mice were determined pathohistologically. The amount of NO in the hemoglobin increased with lengthening the exposure period, attained a constant level after a purified atmosphere. Nitrogen dioxide and nitrites also combined with hemoglobin and the interactions varied among species. Pathohistological changes in the heart, brain, respiratory system, and cell metabolism were noted. Hemoglobin interactions with NO and carbon monoxide are compared.

38557

APTIC NO. 61421

Nakamura, Iemasa, Tatayoshi Arao, Shouhei Inoue,

Tomomichi Ono, Yoshimitsu Ishii, Takahisa Sato, Kentaro Kawaminami, Yoshihiro Maekawa, and Hiroshi Kuwahara

CHRONIC ARSENICAL TOXICOSIS IN TOROKU DISTRICT MIYAZAKI PREFECTURE (REPORT I). (Miyazaki ken Toroku chiku nichassei shita mansei hiso chudokasho ni tsuite-Daigo). Text in Japanese. Kumamoto Igakkai Zasshi (J. Kumamoto Med. Soc.), 47(6):486-515, June 1973.

Chronic arsenic toxicosis was investigated in seven patients ranging in age from 48-70 who lived for many years around a calcinating furnace of an arsenic mine in Toroku District, Miyazaki Prefecture. Various kinds of respiratory and ophthalmologic diseases were noted in their early and family histories. Laboratory findings showed abnormal shadows on chest x-ray photographs in 6 cases, slightly abnormal waves of electroencephalogram in 4 cases, disturbances of olfactory sensation in 5 cases, perceptive deafness in 6 cases, and contraction of the visual fields in 6 cases.

38558

APTIC NO. 61422

Nakamura, Iemasa, Shouhei Inoue, Tomomichi Ono, Takahisa Sato, and Hiroshi Kuwahara

CHRONIC ARSENICAL TOXICOSIS IN OTROKU DISTRICT MIYAZAKI PREFECTURE (REPORT II). (Miyazaki-Ken Toroku chiku nichassei shita mansei hiso chudokasho ni tsuite-Dai2ho). Text in Japanese. Kumamoto Igakkai Zasshi (J. Kumamoto Med. Soc.), 47(6):516-530, June 1973. 81 refs.

The characteristics of chronic arsenism which was previously reported in seven patients living around an arsenic mine located in Toroku District, Miyazaki Prefecture, are compared with other cases reported in the literature. The chronic arsenism in Toroku District occurred from the air pollution with arsenous dust of the calcinating furnace of the arsenic mine. Abnormal shadows in the chest x-ray photographs, slight abnormal waves of EEG, anosmia or hyposmia, perceptive deafness and contraction of visual fields were noted frequently. Perforation of the nasal septum and abnormal peripheral blood findings were not observed. The characteristic cutaneous lesions, arsenical melanosis, arsenical leucoderma, and arsenical keratosis were recognized in all patients. Malignant keratosis was noted in only one case.

38559

APTIC NO. 61395

Oka, M., S. Yamaoka, M. Fukuda, and T. Kanasaki

STUDIES ON EFFECTS OF URBAN POLLUTED AIR ON EXPERIMENTAL ANIMALS, PART III. (Toshi osen taiki ni yoru dobutsu bakuro jikken-dai 3 po). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):424, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973.)

Three groups of 4-week old rats were exposed to atmospheres containing exhaust gases from a heavily travelled area, an area with moderate traffic flow, and a clean room situation for 100 days. Body weights of the animals were determined weekly and the animals were sacrificed for pathological examinations. Average values for pollutants in the heavy traffic area were 6.3 ppm carbon monoxide, 20.6 ppm nitric oxide, 0.047 ppm sulfur dioxide, 7.2 ppm nitrogen dioxide, 4.8 micrograms/cu m acid mist, and 188 micrograms/cu m dust. After 30 days of exposure, the weight ratio of the spleen to total weight for the group in the heavily polluted atmosphere showed a significant increase, and histamines in the lungs decreased. Weight ratios of lungs, kidneys, and adrenal glands to total weight of the group exposed to moderate pollution showed an increase. After 100 days of exposure, weight ratios of lungs, liver, kidneys, adrenal glands, and heart to total weight increased in both groups. Changes in blood chemistry were observed. The total body weight of both groups exposed to pollution showed a significantly smaller increase than the control group.

38560

APTIC NO. 60406

Okamoto, Y., Y. Nakatani, K. Hayashi, and H. Shinagawa

STUDIES ON LUNG CANCER WITH REFERENCE TO AIR POLLUTION IN YOKKAICHI. (Yokkaichi no okeru taiki osen taigan ni tsuite). Text in Japanese. Haigan (Lung Cancer), 13(4):309-316, Dec. 1973. 7 refs.

The possible correlation between lung cancer and air pollution in Yokkaichi district was investigated by looking at the death rate in polluted and non-polluted areas and histologically examining 30 cases of death from lung cancer and five cases of lung cancer with chronic obstructive lung diseases. The percentage of the total death rate due to lung cancer climbed from 0.22% in 1957 to 1.66% in 1970. The percentage of death rate from malignant neoplasm due to lung cancer climbed from 2.13% in 1957 to 9.44% in 1970. The coarse death rate per 100,000 inhabitants went from 1.77 in 1957 to 12.73 at present, increasing equally in both polluted and non-polluted areas (although it was slightly higher in polluted area). The histological types of carcinomas of the 30 deaths from lung cancer are reported, as well as findings on the other five cases mentioned above.

38561

APTIC NO. 56880

Omori, K., K. Abe, and T. Tozawa

INFLUENCE OF OZONE AND PHOTOCHEMICAL REACTION PRODUCTS ON ERYTHROCYTE. (Ozon oyobi kokagaku hanna seiseibutsu no sekkekkyu eno eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):422, Oct. 1973. (Presented at the Japan Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973.)

The influence of ozone on erythrocytes was examined by analyzing the hemolytic pattern of rat blood treated with aqueous solutions of sodium chloride, sodium fluoride, and sodium iodide. An in vitro exposure to 5 ppm of ozone for 1 hr showed some degree of translation of the peak to lower osmotic pressure with NaCl, and a 15 min exposure to 0.3 ppm of ozone showed a slight translation with NaCl and NaF. In vivo exposures to 10 ppm of ozone for 3 hr showed an increase of hemolysis with NaCl, and 0.5 ppm ozone for 3 hr showed a strong increase of hemolysis with NaF. There was no increase with NaI. The hemolytic pattern was analyzed spectrophotometrically.

184

38562

APTIC NO. 61447

Oyama, M. and Y. Miyoshi

THE CHARACTERISTICS OF ALLERGIC AIRWAY DISEASES IN YOKKAICHI. (Yokkaichi ni okeru kido arerugi shikkan no tokushoku). Text in Japanese. Jibi-inkoka (Otolaryngol.), 45(10):729-737, Oct. 1973. 28 refs.

The frequency of airway diseases is 3% in an area around the Shiohama petroleum refinery where the concentration of sulfur dioxide is sometimes as high as 0.5 to 1.0 ppm. Otorhinolaryngological examination of schoolchildren revealed higher morbidities of rhinitis, tonsillitis, paranasal sinusitis, and tonsillar hypertrophy in the polluted areas than in unpolluted areas. Rhinitis, paranasal sinus, and tonsillar hypertrophy decreased between 1968 and 1972, but tonsillitis increased. Among patients older than 40 years with subjective symptoms, questionnaires revealed that 69.8% had upper airway diseases and 53.4% had lower airway diseases. Many people had lowered olfaction or hypersensitivity to odor.

38563

APTIC NO. 60484

Pecora, L. and S. Caccini

STUDIES ON LEAD AND ALA DEHYDRATASE IN PRINTERS AND IN SUBJECTS LIVING IN THE NEIGHBORHOOD OF PRINTING OFFICES. (Recherches sur le plomb et l'ALAD chez les typographes et chez les habitants aux abords des imprimeries). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc. Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 787-795, May 1973. 14 refs. (Oct. 2-6.)

With the aim of contributing to a solution of the problem of the sources of environmental contamination by lead which can affect the population of large cities, the activity of delta-aminolevulinic acid dehydratase (ALAD) in the red blood cells of workers in a printing plant in Naples and 15 people living in the vicinity of the printing plant was studied. The printers showed reduction in the ALAD activity. The people living in the vicinity showed no more signs of lead exposure than the control group. After analyzing the pathogenic theories of the action of Pb on the metabolism of porphyrins and on ALAD in particular, the fact that the Pb comes into direct contact with ALAD is considered. The use of the ALAD test in the diagnosis of poisoning is of little value. The enzyme is extremely sensitive to Pb, which makes it impossible to distinguish between the different degrees of absorption and poisoning. On the other hand, this enzyme may be very useful in epidemiological investigations for measuring pollution and therefore the amount absorbed by the population, particularly if wide cross-sections of the population are kept under observation over several years.

38564

APTIC NO. 60459

Prpic-Majic, D., P. K. Mueller, T. Beritic, R. Stanley, and S. Twiss

DELTA-AMINOLEVULINIC ACID DEHYDRATASE ACTIVITY, LEAD BLOOD LEVELS, AND THE RETICULOCYTE COUNT. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc. Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 211-220, May 1973. 14 refs. (Oct. 2-6.)

Twenty-five rabbits were divided into five experimental groups, Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

DIBENZ(A,H)ACRIDINE. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man: Certain Polycyclic Aromatic Hydrocarbons and Heterocyclic Compounds. Vol. 3, 1973, p. 247-253, p. 247-253. 20 refs.

Chemical and physical properties of dibenz(a,h)acridine (DB(a,h)AC) are reviewed including synonyms, chemical for-

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mula, molecular weight, description, melting point, absorption spectroscopy, solubility and/or volatility, and chemical reactivity. Its use, occurrence, and analytical methods are reviewed. Levels below 300 micrograms/kg of benzene soluble fraction were found in motor exhaust gas. Dibenz(a,h)acridine was present as 0.08 micrograms/1000 cu m of an average urban atmosphere in the U. S. in 1963. It was also present in cigarette smoke, pyrolysis products, and stack gases. Studies of carcinogenicity are reviewed including oral administration of mice, skin application of mice, subcutaneous and/or intramuscular administration of mice, and intravenous administration of mice. Skin application induced skin tumors and s.c. administration induced local sarcomas and increased incidence of lung tumors. No case reports or epidemiological studies on the significance of DB(a,h)AC exposure to man are available. However, coal tar and other materials which are known to be carcinogenic to man may contain DB(a,h)AC.

38446

APTIC NO. 60797

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

DIBENZ(A,J)ACRIDINE. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man: Certain Polycyclic Aromatic Hydrocarbons and Heterocyclic Compounds. Vol. 3, 1973, p. 254-259. 19 refs.

Chemical and physical properties of dibenz(a,j)acridine (DB(a,j)AC) are reviewed including synonyms, chemical formula, molecular weight, description, melting point, absorption spectroscopy, solubility and/or volatility, and chemical reactivity. Its use, occurrence, and analytical methods are described. A level below 300 micrograms/kg of benzene soluble fraction was found in motor exhaust gas. A concentration of 0.04 micrograms/1000 cu m was found for the DB(a,j)AC content of the average American urban atmosphere in 1963. Concentrations of DB(a,j)AC were also present in cigarette smoke, pyrolysis products, and stack gases. Studies of its carcinogenicity are reviewed including oral administration of mice, skin application of mice, and subcutaneous and/or intramuscular administration of mice. The DB(a,j)AC induced skin tumors in mice following topical application and produced local sarcomas at the highest dose tested following subcutaneous administration. It increased the incidence of lung tumors after s.c. administration. Negative results were obtained by the oral route in mice, but the test was inadequate because of the small number of animals. No case reports or epidemiological studies on the significance of DB(a,j)AC to man are available. However, coal tar and other materials which are carcinogenic to man may contain DB(a,j)AC.

38447

APTIC NO. 60798

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

H7-DIBENZO(C,G)CARBAZOLE. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man: Certain Polycyclic Aromatic Hydrocarbons and Heterocyclic Compounds. Vol. 3, 1973, p. 260-268. 20 refs.

Chemical and physical properties of 7h-dibenzo(c,g)carbazole (7H-DB(c,g)C) are described including synonyms, chemical formula, molecular weight, description, melting point, absorption spectroscopy, solubility and/or volatility, and chemical reactivity. Analytical methods include thin-layer chromatography and spectrometric, spectrofluorimetric, and fluorescent spot tests. Cigarette smoke contains 7H-DB(c,g)C. Studies of the carcinogenicity of 7H-DB(c,g)C are reviewed including oral administration to mice, skin application to mice, inhalation and/or intratracheal administration to mice, subcutaneous and/or intramuscular administration to mice and rats, intraperitoneal administration to mice, intravenous injection of mice, and bladder implantation of mice and dogs. The 7H-DB(c,g)C was carcinogenic in the mouse, rat, hamster, and

possibly in the dog. It had both a local and systemic carcinogenic effect. Following oral administration in the mouse, forestomach tumors and hepatomas occurred; intratracheal administration to hamsters produced tumors of the respiratory tract. In comparison with benzo(a)pyrene, 7H-DB(c,g)C was a stronger respiratory tract carcinogen for the hamster. No case reports or epidemiological studies on the significance of 7H-DB(c,g)C exposure to man are available. The contribution of heterocyclic compounds from some environmental sources to the overall carcinogenic risk to man is possible.

1972

38448

APTIC NO. 60741

Antweiler, H.

SULFUR OXIDES (Schwefeloxyde). Text in German. Medizinisches Inst. fuer Lufthygiene und Silikoseforschung, p. 53-63, 1972. 30 refs.

Recent dispersion studies and epidemiological surveys concerning sulfur dioxide, and animal tests on the acute and chronic effects of this air pollutant are reviewed. Sulfur dioxide, formed primarily during combustion processes, may be present in considerable concentrations in the atmosphere even at high altitudes. No changes in the tidal volume, dynamic compliance, flow resistance, carbon monoxide uptake, hematocrite, hemoglobin, erythrocyte, and leukocyte levels were observed in guinea pigs that had been exposed to 0.13-5.72 ppm concentrations of SO₂. Thickening of the alveolar walls with histiocyte infiltration, bronchiectases and bronchioleciases due to short-term exposure to 572-2860 mg/cu m were found in Cynomolgus. Increased susceptibility to pulmonary infections and general depression of the antibody formation due to SO₂ were evidenced. Both the physiological and histological changes caused by SO₂ were reversible. Bronchial hypersensitivity to acetyl cholin was induced by SO₂. Combinations of 10 mg/cu m doses of SO₂ with 20 mg/cu m doses of carbon monoxide or 10 mg/cu m concentrations of quartz dust caused increase in the duration of the latency times of reflexes and reactions in rats. Combinations of SO₂ and nitrogen dioxide (2.25 mg/cu m and 1.20 mg/cu m, respectively) caused changes in the estrus cycle and the genital function of rats. Epidemiological surveys revealed close correlation between the incidence of chronic bronchitis and the atmospheric SO₂ concentrations.

38449

APTIC NO. 60678

Beck, E. G. and N. Stanojlovic

LEAD (Blei). Text in German. In: Medizinisches Institut fuer Lufthygiene und Silikoseforschung, p. 34-41, 1972. 18 refs.

Studies on the toxic effects of lead in human and animal organisms are reviewed. The reduction of the delta-aminolevulinic acid dehydratase activity in the erythrocytes and in the brain is a sensitive indicator of prolonged exposure to small lead concentrations either in the air or in foods without clinical manifestation of lead poisoning. Close correlation between the reduction of the enzyme activity and the degree of lead exposure, and between the reductions in this enzyme activity in the erythrocytes and in the brain were established. The ratio of the enteral and in traperitoneal resorption of lead was 1:10, while the enteral resorption was well below 10% of the oral resorption. Destruction of alveolar macrophages by lead oxides and lead bromide inhaled was observed in guinea pigs. Reduction of the rate of benzo(a)pyrene breakdown by alveolar macrophages in lead-exposed animals, and increased susceptibility of the animals to infections by e.g., *Salmonella typhi* murium and *Candida albicans* were stated. Peripheral neuropathy due to segmental demyelination was found in subjects exposed chronically to lead with manifestations of lead poisoning.

38610

APTIC NO. 60876

Brockhaus, A.

NITROGEN OXIDES. (Stickstoffoxide). Text in German. In: *Medizinisches Institut fuer Lufthygiene und Silikoseforschung. Jahresbericht 1971.* Duesseldorf. Michael Triltsch Verlag, 1972. p. 82-89. 37 refs.

Studies on the occurrence, formation, and toxic effect of nitric oxide, nitrous oxide, nitrogen dioxide, and organic nitrogen oxides in photochemical smog are reviewed. Nitrous oxide, present in the atmosphere in nearly constant concentrations of 0.45 mg/cu m, is formed mainly by soil bacteria during the decomposition of nitrogen-containing compounds. No toxic effects of atmospheric N₂O have yet been ascertained. Nitric oxide, formed mostly by bacteria, is present in the air in a background concentration of 0.002 mg/cu m against concentrations of 0.04-0.12 mg/cu m in urban air, due to its formation in combustion processes. With an average half-life period of 4 days in the atmosphere, it forms NO₂ with air oxygen or ozone. This reaction may be accelerated by other air pollutants. Narcosis and methemoglobinemia were observed in mice following inhalation of 1500-3000 mg/cu m concentrations of NO. Nitrogen dioxide is primarily formed from NO in combustion processes. Its background concentration in the air is 0.008 mg/cu m, against values of 0.045-0.18 mg/cu m in urban air. It is photolyzed to NO and active oxygen which forms ozone and organic NO_x, such as peroxyacetyl nitrate, in the presence of hydrocarbons. Increased susceptibility to infection, changes of the molecular structure of proteins and lipids, lesions of the alveolar epithelium, infiltration of the perivascular tissue, and vasodilatation due to inhaled NO₂ were observed. Peroxyacetyl nitrate exerts a powerful irritating effect on the conjunctiva and mucosa.

38611

APTIC NO. 60869

Deleanu, M., N. W. Ghelberg, and N. Moldovan

DATA ON THE MORBIDITY OF THE POPULATION IN A NONFERROUS METALLURGICAL AND CHEMICAL INDUSTRIAL CENTER. (Date asupra morbiditatii populatiei dintr-un centru cu industrie chimica si metalurgica neferoasa). Text in Romanian. *Igiena* (Bucharest), 21(9):529-535, Sept. 1972.

The influence of lead on respiratory, cardiovascular, and blood diseases, as well as on rickets and diseases of the hematopoietic organs, was studied through the health statistics for adults and children in a highly polluted industrial center. Morbidity of chronic bronchitis in adults was 7.6 times the occurrence in control areas; 3.3 times more frequent for cardiovascular disorders; 5.7 times as often for gastrointestinal problems; and 3.5 times as frequent for diseases of the blood and hematopoietic organs. Childhood respiratory tract diseases occurred 3.1 times more frequently in the polluted areas as in the control areas; acute infections 3.0; influenza 2.9; acute bronchitis 4.5; and chronic bronchitis 2.3 times more often. Rickets appeared 3.7 times more often and diseases of the blood and hematopoietic organs occurred 6 times more frequently.

38612

APTIC NO. 60870

Deleanu, M., A. Antal, N. Moldovan, Edit Bretter, Lucia Costin, and E. Borda

DATA ON THE MORBIDITY FROM RESPIRATORY DISEASES AND MORTALITY FROM PULMONARY CANCER, DEPENDING ON THE POLLUTION OF THE AIR. (Date privind morbiditatea prin afectiuni respiratorii si mortalitatea prin cancer pulmonar, in raport cu poluarea aerului). Text in Romanian. *Igiena* (Bucharest), 21(4):199-206, April 1972.

The influence of air pollution on the morbidity of respiratory diseases and mortality from pulmonary cancer in Transilvania was studied from 1964 to 1968. Investigations were based on government health statistics and questionnaires surveying both

healthy respondents and persons with chronic bronchitis. Statistical morbidities and risk factors were calculated per 1000 adults and children in both polluted and control areas. A risk factor is an index showing how many times the morbidity of a disease is higher in a polluted area than in a control area. The risk factor for adult respiratory diseases was 200%, and it varied in children from 320 to 270%. Acute upper respiratory infections had a risk factor of 210% to 230% for adults and 210-310% in children. Acute bronchitis risk factors ranged from 490% to 220% in children, and 220-1930% in adults. Air pollution increases the morbidity of respiratory diseases, but does not seem to affect mortality due to bronchopulmonary cancer.

38613

APTIC NO. 60868

Ghelberg, N. W., Ingrid Ruckert, and H. Straus

THE LEAD CONTENT OF MILK IN AN AREA WITH NONFERROUS METALLURGICAL INDUSTRY. (Conținutul de plumb in lapte, într-o zona cu industrie metalurgică neferoasă). Text in Romanian. *Igiena* (Bucharest), 21(1):17-22, Jan. 1972.

Lead contents in maternal and cow milk in a town polluted by a non-ferrous metallurgical industry and a control area were measured in order to determine what proportion of lead is excreted in the milk and consumed by infants. Morphological, hematological, and metabolic changes were previously noted in infants raised in lead-polluted areas. Very small concentrations of lead appeared in the cow milk with no variations in sampling locations, due to the fact that the milk analyzed came from rural, unpolluted areas. The 28 samples of maternal milk from the industrial area contained lead concentrations of 23-120 micrograms, with an average of 43 + or - 27.6 micrograms % of the sample. The only sample containing lead in the control area showed a concentration of 3.0 micrograms lead. No significant differences in the lead concentrations at some distance from the industrial center indicated that dispersion is not a relevant factor in this investigation.

38614

APTIC NO. 60867

Grella, G., B. Arcidiacono, and A. Coscia

THE DIAGNOSTIC SIGNIFICANCE OF ASBESTOS BODIES IN THE EXPECTORATE, AND ENVIRONMENTAL CONTAMINATION. CONSIDERATIONS DERIVING FROM A PERSONAL RESEARCH. (I corpuscoli dell'asbesto nell'espettorato nel loro significato diagnostico e di contaminazione ambientale). Text in Italian. *Lotta Contra Tuberc. Malattie Polmonari Soc.*, 42(3):470-482, July-Sept. 1972. 59 refs.

General problems of asbestos in the air, and studies on the formation of asbestos bodies and on the development of asbestosis are reviewed, and results of investigations of expectorate (sputum) samples from industrial workers exposed to asbestos are presented. A progressive increase in the occurrence of asbestos bodies in the population, even in urban agglomerations far from any major source of asbestos, was observed. In addition to asbestos bodies, also pseudosbestos bodies, formed from different types of dusts inhaled, were detected. Asbestos bodies were also found in feces, the spleen, lymph nodes, tonsils, and tissue from bronchial carcinomas and pleural and peritoneal mesotheliomas. The frequent scarcity of asbestos bodies in men who had been exposed to asbestos for a long time, the irregular distribution of the asbestos bodies, and the labile and uncertain relationship between the number of visible asbestos bodies and the degree of the fibrosis all indicated that the presence and the quantity of asbestos bodies are not representative of the stage of advancement of the pneumoconiosis. Investigations for asbestos bodies of 193 expectorate samples from workers among whom high incidence of asbestosis had been ascertained revealed an inverse proportion between the frequency of positive expectorate samples and the duration of the exposure. In a group exposed to asbestos for 5 to 10 yr the percentage of the posi-

tive findings was 40.2%, which fell to 26% in another group with exposures ranging from 10 to 15 yr, and further to 20.7% in a third group that had been exposed to asbestos for more than 15 yr. Pneumoconiosis was ascertained by the expectorate tests in all but 17 of a total of 193 cases, which indicates the great importance and relevancy of expectorate tests in the diagnosis of asbestosis.

38615

APTIC NO. 60640

Grieser, N.

HYDROCHLORIC ACID. (Chlorwasserstoff). Text in German. Medizinisches Inst. fuer Luftthygiene und Silikoseforschung, p. 64-68, 1972. 32 refs.

Studies on the effects of hydrochloric acid and plants and on the human organism, as well as methods for the monitoring of atmospheric hydrochloric acid concentrations are reviewed. Gaseous hydrochloric acid penetrates the stomata of the leaves, and reduces the assimilation by damaging the mesophylls in the chloroplasts. In a concentration of 1:500,000, HCl reduced the assimilation by 50-60%. In the human organism, gaseous HCl irritates the mucous membranes, and causes laryngitis, glottal edema, bronchitis, and lung edema. In a concentration of 7 mg/cu m, it causes persistent teeth damage. The limit of perceptibility for HCl is 0.1 mg/cu m, which is regarded as threshold value concerning the influence of HCl on the rhythm and intensity of respiratory motions. The respective threshold values for the light sensitivity of the eye and for optic chorioretinitis are 0.2 mg/cu m and 0.6 mg/cu m. The long-term and short-term maximum allowable concentrations of HCl in the air are 0.7 mg/cu m and 1.4 mg/cu m, both representing 30-minute values. Quantitative determination of HCl in a minimum concentration of 0.7 micrograms of chloride is possible by the x-ray fluorescence method, while photometric determination is possible to a limit of 1 microgram.

38616

APTIC NO. 60740

Grieser, N.

HYDROFLUORIC ACID. (Fluorwasserstoff). In: Medizinisches Institut fuer Luftthygiene und Silikoseforschung Jahresbericht 1971. Text in German. Duesseldorf, Michael Tritsch Verlag, 1972, p. 69-89. 77 refs.

Studies on the mechanism of action, resorption, elimination, and the acute, subacute and chronic effects of hydrofluoric acid in the human and animal organisms are reviewed. Fluorine can enter the human and animal organism enterally, pulmonally, or percutaneously. The resorption after enteral uptake is strongly dependent on the solubility of the fluorine compounds. Very rapid diffusion of fluorine in tissues and body fluids was observed. Chlorine is eliminated from the organism mainly by the kidneys, while residual fluorine is incorporated in bones from which it may again enter the blood. Cumulation of fluorine in soft tissues was not evidenced. Fluorides inhibit numerous enzymatic processes due to the formation of fluorine-containing enzyme antagonists, and through binding the metallic cofactors of the enzymes. Retardation of the proliferation and destruction of bone cells, and gelatin-like degeneration of the bone marrow due to fluorine were observed. Pathologic changes of bones are possible at fluorine concentrations of 3000 to 5900 ppm. Changes in the metabolism in organs and bones, anorexia, cachexia, diarrhea, lesions of the renal tissues, and exostoses may occur in subacute poisoning by fluorine. Acute poisonings are characterized by such symptoms as changes in the enzymatic processes, especially in calcium and glucose metabolism, muscular fibrillation, clonicotonic spasms, hyperpnea, lachrymation, salivation, intensified intestinal tonus, gastroenteritis, and necrosis of the myocardium. The maximum allowable workplace concentration of hydrofluoric acid in West Germany is set at 2 mg/cu m.

38617

Kita, H.

ENVIRONMENTAL POLLUTION AND HEALTH (SPECIAL LECTURE AT THE THIRTY-SEVENTH ANNUAL MEETING OF JAPANESE ASSOCIATION OF PHYSICAL MEDICINE, BALNEOLOGY AND CLIMATOLOGY). (Dai 37kai Nippon Onsen Kiko Butsuri Igakukai Sokai, Tokubetsu kosen; Kankyo oson to kenko). Text in Japanese. Nippon Onsen Kiko Butsuri Igakukai Zasshi, (J. Japan. Assoc. Phys. Med., Balneol. Climatol.), 36(12):34-36, Oct. 1972.

The air pollutants sulfur dioxide, nitrogen oxides (mainly nitrogen dioxide), carbon monoxide, lead, hydrogen fluoride, cadmium, vanadium, ozone oxidants, aldehyde, peroxyacetyl nitrates, and smoke are discussed. Better indices of air pollution than SO₂, CO, and dust (the currently used indices) are needed. The effects of air pollution on humans, especially the elderly, infants, and the sick, are reviewed. The relationships between environmental pollution and Minamata and Itai-Itai disease are discussed. Bathing in, drinking and inhalation of hot-spring water is suggested as a possibly beneficial practice.

38618

APTIC NO. 61526

Mitani, Kazunori, Michio Hoshino, Hironobu Tsuchiya, Kyoko Itaya, and Masato Kondo

ACTUAL STATE OF ENVIRONMENT IN LEAD WORKSHOP BASED ON MEASUREMENTS DURING PAST FIVE YEARS. (Naman shokuba no kankyo jitai, kako 5-nenkan no sokutei kekka yori). Text in Japanese. Nagoya-shi Eisei Kenkyushobo (Ann. Rept. Nagoya City Health Res. Inst.), no. 19:145-149, Oct. 1972. 13 refs.

Evidence of lead poisoning was found in 13.7% of 23,910 workers examined in 1965 and 13.9% of 8365 workers examined in 1956. The actual state of lead pollution in occupational exposure sites in transportation equipment manufacturing, lead alloy manufacturing, used lead salvaging, printing, mechanical and electrical parts manufacturing, and automobile parking and inspection was measured. Lead fumes and dusts are generated in these industries and concentrations are generally high.

38619

APTIC NO. 60354

Nagata, M. and T. Tsuji

EXAMINATION OF CHILDREN IN AIR POLLUTED DISTRICT SEEN FROM THE RELATIONSHIP OF INCREASE OF BODY HEIGHT AND VOLUME OF VENTILATION IN LUNG. (Shincho, hai kankiryō no zōka no kenren yori mita taiki oson chūki gakudo no kentō). Text in Japanese. Minzoku Eisei (Human Hyg.), 38(6):280, Nov. 1972. (Presented at the XXXVII Annual Meeting of Japanese Society Race Hygiene.)

The results of examinations for pollution-related injuries of schoolchildren in their third year were compared to examinations of the same children in their fifth year. The differences that were found between children in a polluted area and those in a non-polluted area in the first examination were not found in the follow-up examination. The increase in vital capacity between the two examinations was higher for children in the polluted area than for those in the control area. The increase in body height was the same in both groups. The increase in body height was highly correlated with an increase in vital capacity in the control group, but not in the children from the polluted area.

38620

APTIC NO. 61090

Sova, R. Y., V. G. Tsapko, and V. L. Gokhman

ASSAY OF DEGREE OF EFFECT OF ENVIRONMENTAL FACTORS WITH MULTIPLE COMBINED ACTIVITY. (Analiz sily vliyaniya faktorov sredy pri mnogokratnom kombinirovannom vozdeystvii). Text in Russian. Gigiena Truda i Prof. Zabolovaniya, no. 2:46-48, 1972.

The combined effects of various degrees of environmental factors were studied by dispersion analysis in albino rats exposed to the combined effects of carbon monoxide with cobalt chloride, and of trichlorfon with noise. Exposure to noise with 106 dB intensity for 2 days daily led to increased brain cholinesterase activity by 16.7% after 20 days, while trichlorfon alone, administered in 1/20 LD50 doses, reduced the cholinesterase activity by 43%. The combination of trichlorfon with noise resulted in a decrease of 32.4% in the cholinesterase activity. The degree of the effect of noise was found to increase with time, and the effect of one factor was found to be dependent of the degree of the other factor. The dispersion analysis is suitable for predicting the combined effect of different factors.

38621

APTIC No. 60894

Strauss, H. and M. Deleau

CONTRIBUTIONS TO THE METHODOLOGY OF INVESTIGATIONS ON THE INFLUENCE OF AIR POLLUTION ON THE HUMAN ORGANISM. (Contributii la metodologia de cercetare a influentei poluarii atmosferei asupra organismului uman). Text in Romanian. *Igiena* (Bucharest), 21(9):549-554, Sept. 1972.

Research methodologies used to obtain the field results of an epidemiological survey of air pollution are given. The recommended investigative steps include: collection of data from industrial emission sources, micrometeorological studies, and demography, qualitative and quantitative measurements of air pollution; and examination of the present zoning regulations and air quality standards. Ionization of the air, solar radiation, opacity, and oxidation potentials of the atmosphere were studied in an industrial area polluted by construction material and chemical industries. Epidemiological studies of children and adults indicated a higher morbidity of respiratory disease in the polluted areas. Allergic reactions were also intensified. Effects of industrial emissions of sulfur dioxide, chlorine, and lead on human health are studied.

38622

APTIC No. 60538

National Heart and Lung Inst., Task Force on Research in Respiratory Diseases

ENVIRONMENTAL DISEASES. In: *Respiratory Diseases. Task Force Report on Problems, Research Approaches, Needs*. National Heart and Lung Inst., Lung Program, Dept. of Health, Education, and Welfare Pub. (NIH) 73-432, p. 31-44, Oct. 1972. 36 refs.

GPO

Environmental factors including pollution, occupational exposure, smoking, and other factors can cause lung disease. Many workers exposed to dust in industries such as the textile and asbestos industries have developed respiratory diseases. Cigarette smoking has been linked to cancer, heart disease, and respiratory disease. Data on air pollution effects is unclear because of concomitant effects from other sources of lung disease such as smoking, but it appears that air pollution can cause lung disease and can enhance lung disease in persons exposed to other environmental factors. The current state of knowledge including epidemiological data for the various environmental factors are discussed, including etiological factors, multiple-factors, dose-response relationships, population studies, therapy, and fundamental research. The necessary information needed in research studies of environmental effects are described.

38623

APTIC No. 60589

National Heart and Lung Inst., Task Force on Research in Respiratory Diseases

ALLERGIC AIRWAYS DISEASE: ASTHMA. In: *Respiratory Diseases. Task Force Report on Problems, Research Approaches, Needs*. National Heart and Lung Inst., Lung Program, Dept. of Health, Education, and Welfare Publication No. (NIH) 73-432, p. 63-72, Oct. 1972. 11 refs.

Recent awareness of new allergens in the environment has been associated with the discovery of new forms of asthma, a disease characterized by an increased responsiveness of the trachea and bronchi to various stimuli and made manifest by difficulty of breathing due to generalized narrowing of the airways. Industrial workers manufacturing detergents containing enzymes derived from *Bacillus subtilis* have shown a significant incidence of asthma, with similar cases having been found among housewives with lesser exposure. Smoking, which exerts a deleterious effect on asthma, is probably the most widespread concentrated chronic source of air pollution and should be studied as an etiologic factor. Exposure to a variety of environmental antigens, both natural and artificial, in people with the appropriate immunologic constitution leads to the production of a unique kind of immunoglobulin, IgE. This protein, although found in small amounts in nonallergic people, represents antibodies to the environmental antigens and has the capacity to attach to certain cells (tissue mast cells of basophils) in the mucous membranes and skin.

38624

APTIC No. 60714

National Heart and Lung Inst., Task Force on Research in Respiratory Diseases

CHEMICAL STRUCTURE AND FUNCTION OF THE LUNG. In: *Respiratory Diseases. Task Force Report on Problems, Research Approaches, Needs*. National Heart and Lung Inst., Lung Program, Dept. of Health, Education, and Welfare Pub. (NIH) 73-432, p. 15-29, Oct. 1972. 41 refs.

GPO

The physiological capacities of the lung and thorax that relate to diffusion of gases, ventilation, distribution of air and blood, pulmonary hemodynamics, and mechanical characteristics of airways and alveoli are discussed. The current state of knowledge is reviewed with regard to the connective tissue structure of lung parenchyma and airways, the chemical mechanisms of pulmonary injury, phospholipid and protein synthesis by the lung, intermediate metabolic functions by lung tissue, glycoprotein structure of the lung, and special problems of implementing studies on chemical structure and function of the lung. Investigations should focus on lung histology and on the chemistry and metabolism of collagen and elastin in normal subjects, patients with various pulmonary diseases, and individuals with genetic predisposition to particular diseases. Particular attention should be directed to alterations with age, sex, and environmental influences. Biochemical and histological investigations should be addressed to the roles of proteins, phospholipids, enzymes, and cells implicated in the mechanisms of lung injury. Training programs are needed to develop investigators with interest in pulmonary problems and with knowledge of fundamental disciplines essential to the study of lung chemistry, structure, and function.

38625

APTIC No. 60757

National Heart and Lung Inst., Task Force on Research in Respiratory Diseases

DIFFUSE PULMONARY FIBROSIS AND ACQUIRED CONNECTIVE TISSUE DISEASES. In: *Respiratory Diseases. Task Force Report on Problems Research Approaches Needs*. National Heart and Lung Inst., Lung Program, Dept. of Health, Education and Welfare Rept. (NIH) 73-432, p. 73-86, Oct. 1972. 31 refs.

GPO

Common to the widespread interstitial pulmonary diseases such as idiopathic chronic disease interstitial pneumonitis, acquired connective tissue disease (collagen disease), and diffuse pneumonitis (all of unknown cause with the exception of radiation- or drug-induced diffuse pneumonitis) is the clinical pattern associated with dyspnea fine crepitant rales late in inspiration. Vital capacity and total lung capacity are reduced in most instances, although the maximum ventilatory capacity is well preserved. Both static and dynamic lung compliance are

reduced, and the work of breathing increased; in many cases, disturbances of ventilation-perfusion relationships can be demonstrated. Exogenous agents, including viral infections, some drugs, radiation have been implicated as some of the etiologic factors, with immune injury believed to play the central role and genetic factors modifying susceptibility and expression. Airway administration to animals of various materials such as quartz dust, mercury vapor, cadmium sulfate aerosol, ozone, foreign antigen, and heterologous antitumor serum have succeeded in producing interstitial lung damage, although the damage has not evolved into a condition which closely resembles that in human disease.

38626

APTIC NO. 60770

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

BERYLLIUM AND BERYLLIUM COMPOUNDS. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 1, 1972, p. 17-28. 36 refs.

Chemical and physical properties of beryllium and its compounds are discussed including synonyms, chemical formulas, molecular weights, description, boiling and melting points, hardness, density, solubility, and chemical reactivity. Compounds discussed include beryllium oxide, beryl, and beryllium sulfate. Their use and occurrence are described. Studies of the carcinogenicity of beryllium and its compounds in animals are discussed including inhalation studies of rats, hamsters, rabbits, and monkeys; intravenous administration of mice and rabbits; and intramedullary administration of rabbits. Metabolism in rats and man, and observations in man (case reports and epidemiology) are reviewed. Experimental evidence for the carcinogenicity of beryllium, beryllium salts, or beryl exists for three animal species. In particular, beryllium sulfate, beryl ore, and bertrandite produce lung tumors in rats following inhalation exposure; beryllium oxide and beryllium sulfate produce tumors in monkeys following intrabronchial implantation or inhalation; and zinc beryllium silicate, beryllium metal, and beryllium phosphate produce bone tumors in rabbits following intravenous administration. Several epidemiological studies have been carried out on the possible relationship between exposure to beryllium compounds and the occurrence of cancer in man. These studies have not provided evidence of the existence of such a relationship.

38627

APTIC NO. 60771

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

HAEMATITE AND IRON OXIDE. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 1, 1972, p. 29-39. 41 refs.

Chemical and physical properties of haematite and iron oxide (Fe₂O₃) are reviewed including synonyms, chemical formula and molecular weight, description, melting point, specific gravity, solubility, chemical reactivity, and technical products and impurities. Use, occurrence, and analytical methods are described. Studies of carcinogenicity in animals are described including inhalation and intratracheal administration in mice, hamsters, and guinea pigs and subcutaneous implantation in rats. Metabolism in animals and man and observations in man (haematite miners, foundry workers, metal grinder, welders and hot metal workers, silver finishers, boiler scalers, and shipyard workers) are described. Ferric oxide given by inhalation or by intratracheal injection was not carcinogenic in animals. On the basis of epidemiological evidence, exposure to haematite dust increased the risk of lung cancer development in man. The risk was manifest in underground workers but not surface workers. There was no evidence that haematite or ferric oxide influenced the incidence of cancers at sites other than the lungs.

38628

APTIC NO. 60772

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

LEAD SALTS. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 1, 1972, p. 40-50. 26 refs.

Chemical and physical properties of lead salts are described including synonyms, chemical formulas, molecular weight, description, melting point, density, solubility, and stability. These salts include lead acetate, lead subacetate, lead arsenate, lead carbonate, and lead phosphate. Their use, occurrence, and analytical methods are described. People living in cities in Europe absorb 20-30 micrograms of Pb/day from the atmosphere and between 200 and 300 micrograms from food. Lead has also been found in soil and water. The average American may take in 400 micrograms of Pb/day in food, air, and water which is about 30 times higher than expected under natural conditions; this gives rise to increased body burdens of Pb. The carcinogenicity of lead was studied by oral administration of mice, rats, and hamsters, subcutaneous administration of rats, and subcutaneous injections followed by intraperitoneal injections. Lead metabolism in animals and man, and case reports and epidemiological studies of man are reviewed. Lead acetate was carcinogenic in rats and mice; lead subacetate and lead phosphate were carcinogenic in the rat. Given orally, they produced benign and malignant tumors of the kidney. Other results were not conclusive. The pattern of absorption metabolism and storage of lead in the body seemed to be similar in all animal species that have been studied. The kidney was a target from the point of view of toxicity in all animal species studied. Renal enlargement and the appearance of intranuclear inclusion bodies in the epithelial cells occurred in all laboratory animal species and in man in the same way. There was no evidence to suggest that exposure to lead salts caused cancer of any site in man. However, only one epidemiological study of the relationships between exposure to lead and the occurrence of cancer was reported. The level of human exposure equivalent to the levels of lead acetate producing renal tumors in rats in 810 mg/day (550 mg Pb). This level appears to exceed by far the maximum tolerated dose for man.

38629

APTIC NO. 60773

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

CARBON TETRACHLORIDE. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 1, 1972, p. 53-60. 28 refs.

Chemical and physical properties of carbon tetrachloride are reviewed including synonyms, chemical formulas, molecular weight, description, boiling point, density, refractive index, specific gravity, solubility, volatility, stability, chemical reactivity, technical products, and impurities. The use, occurrence, and analytical methods for CCl₄ are described. Studies of the carcinogenicity of CCl₄ are discussed including oral administration to mice, rats, hamsters, dogs, and trout; inhalation studies of rats; subcutaneous administration to mice and rats; and intrarectal administration to mice. Metabolism in animals and man and case reports to observations in man are reviewed. Carbon tetrachloride produced liver tumors in animals following several routes of administration, including inhalation and oral ingestion. The results in trout were of borderline significance. There was no evidence of carcinogenicity for organs other than the liver, but most experiments were shorter than the life-span of the animals. No single-dose carcinogenic experiment with long follow-up was reported. No long-term follow-up studies on men exposed to CCl₄ were reported. The occasional case reports of liver tumors in man following acute intoxication were of doubtful significance, but could not be disregarded.

38630

APTIC NO. 60774

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

N-NITROSODIMETHYLAMINE. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 1, 1972, p. 95-106. 78 refs.

The chemical and physical properties of N-nitrosodimethylamine (DMN) are described including synonyms, chemical formulas, molecular weight, description, boiling point, density, refractive index, absorption spectroscopy, identity and purity test, solubility, volatility, stability, and chemical reactivity. Its use, analytical methods, and occurrence are described. Studies on the carcinogenicity of DMN are reviewed including oral administration of mice, rats, hamsters, guinea pigs, rabbits, and trout; subcutaneous administration of mice, hamsters, and mastomys; intraperitoneal administration of mice and rats; inhalation of rats; injection of rats and newborn animals; and transplacental injections of rats and mice. Its metabolism in animals and man is reviewed. N-nitrosodimethylamine was carcinogenic in all animal species tested. The main target organs were the liver and the kidney. Tumors were induced following different routes of administration including ingestion and inhalation. It was carcinogenic following prenatal exposure and in single-dose experiments. Similarities in metabolism in human and rat liver tissues were reported. Exposure to DMN causes necrosis and cirrhosis (after 2 years) in man. Data on DMN's occurrence must await confirmation by more adequate analytical methods. Recent results, confirmed by mass spectrometry, indicate that DMN does occur in certain food products at the 5-10 ppb level. There is more indication that DMN might be formed from ingested dimethylamine and nitrosating agents in vivo. Both precursors can occur in food. No long-term follow-up studies of humans exposed to DMN are known.

38631

APTIC NO. 60775

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

N-NITROSODIETHYLAMINE. In: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 1, 1972, p. 107-124. 102 refs.

Chemical and physical properties of n-nitrosodiethylamine (DEN) are described including synonyms, chemical formula, molecular weight, description, boiling point, density, refractive index, absorption spectroscopy, identity and purity test, solubility, volatility, stability, and chemical reactivity. Use, analytical methods, and occurrence are discussed. Studies of carcinogenicity are discussed including oral administration of mice, rats, hamsters, guinea pigs, rabbits, dogs, pigs, monkeys, and fish; skin applications of mice and hamsters; inhalation and intratracheal administration of rats and hamsters; subcutaneous administration of mice, hamsters, and guinea pigs; intraperitoneal administration of mice, rats, hamsters, and monkeys; intravenous administration of rats, rectal administration of rats, intramuscular administration of parakeets, and transplacental injection of mice, rats, and hamsters. The DEN metabolism in animals and man is reviewed. N-nitrosodiethylamine was carcinogenic in all animal species tested. The main target organs were the nasal cavity, trachea, lung, esophagus, and liver. Tumors were induced with all the routes of administration, with single-dose experiments, and following prenatal exposure. Much of the data on the effects on humans has been collected by inadequate analytical methods and must await confirmation. The possibility of a formation of DEN from precursors, diethylamine and nitrosating agents, in vivo, must receive further attention. No long-term studies of human subjects exposed to DEN are known.

190

38632

APTIC NO. 60805

National Heart and Lung Inst., Task Force on Research in Respiratory Diseases

NON-ALLERGIC AIRWAYS DISEASES. In: Respiratory Diseases. Task Force Report on Problems, Research Approaches, Needs. National Heart and Lung Inst., Lung Program, Dept. of Health, Education, and Welfare Pub. (NIH) 73-432, p. 45-61, Oct. 1972. 27 refs.

GPO

The magnitude, history, and current state of knowledge of nonallergic respiratory diseases are described. These diseases include chronic bronchitis, emphysema, and bronchiectasis. Only nonallergic diseases in adults are discussed. Chronic bronchitis and emphysema include conditions generally grouped under the designations of irreversible airways obstruction, chronic obstructive pulmonary disease, or small airways disease. The etiology, pathogenesis, pathology, pathophysiology, pulmonary defense mechanisms, and use of models of these diseases are described. Pollution, smoking, genetic predisposition, and other factors can effect the development of these diseases. Models which can be used to study nonallergic respiratory diseases include animal, mechanical, electrical, and mathematical types. Resources and special research approaches to the study of these diseases are discussed including manpower needs and availability, interdisciplinary research, cooperative studies, and technologic improvements. Since chronic bronchitis and emphysema are irreversible, early detection would reduce the incidence of these diseases and their disabilities. Early diagnosis depends on the development of a simple, reliable noninvasive test which can be widely applied to apparently healthy persons. Interlaboratory and interdisciplinary training and cooperation is necessary to assess the validity and usefulness of tests for early diagnosis and to study the factors associated with high risk.

38633

APTIC NO. 60806

National Heart and Lung Inst., Task Force on Research in Respiratory Diseases

HYPERSENSITIVITY PNEUMONITIS. In: Respiratory Diseases. Task Force Report on Problems, Research Approaches, Needs. National Heart and Lung Inst., Lung Program, Dept. of Health, Education, and Welfare Pub. (NIH) 73-432, p. 87-100, Oct. 1972. 22 refs.

GPO

Hypersensitivity pneumonitis (extrinsic allergic alveolitis) is a diffuse interstitial granulomatous lung disease due to an allergic reaction following inhalation of a specific organic dust. Among the first antigens recognized as capable of producing this reaction were species of the mold *Aspergillus*. Many other antigens are suspected of producing similar reactions. Immunogenic requirements, pathogenesis of the disease, diagnosis, magnitude of the disease, history of the disease, and factors affecting the etiology, severity, or progression of hypersensitivity diseases are discussed. Factors which affect hypersensitivity pneumonitis are age, genetics, and environment. Environmental factors include geography in relation to occupation, toxic factors such as air pollution, tobacco smoke, and industrial exposures to irritants, and infections. The most promising approach to understanding the pathogenesis of hypersensitivity pneumonitis is through animal models. Studies are needed of the mechanisms by which inhaled antigens produce immunogenic response; the roles of humoral and cellular mechanisms in the production of various pulmonary lesions; the effects of immunoglobulin class and biological activity on hypersensitivity reactions; methods for identifying antigens; and long-term follow-up studies of known cases with different etiologies.

38634

APTIC NO. 60899

National Heart and Lung Inst., Task Force on Research in Respiratory Diseases

GRANULOMATOUS LUNG DISEASES. In: Respiratory Diseases: Task Force Report on Problems, Research Approaches, Needs. National Heart and Lung Inst. Lung Program, Dept. of Health, Education, and Welfare Rept. (NIH) 73-432, p. 101-113, Oct. 1972. 14 refs.

GPO

Granulomatous diseases of the lung, including sarcoidosis, Wegener's granulomatosis, and eosinophilic granuloma, represent a borderland between infections and neoplasms. Only sarcoidosis is prevalent enough to be considered a national health problem, and the disease has histological features resembling those of mycobacterial and fungal infections. Sarcoidosis is a disease with extraordinary immunologic characteristics: most patients have a permanent disturbance of delayed hypersensitivity responses, a moderate and seemingly nonspecific increase in certain circulating antibodies, and transient or prolonged reactivity to Kveim antigens. Epidemiologic studies have demonstrated an uneven distribution of sarcoidosis, with the greatest frequency in Northern Europe, the United States, and Australia. It is uncertain whether environmental or geographic factors or variations in diagnostic resources are responsible for the difference in worldwide distribution of sarcoidosis. Efforts to produce a satisfactory model of sarcoidosis in experimental animals have been unsuccessful; however, several investigators have succeeded in producing local granulomas resembling the epithelioid tubercle of sarcoidosis at the sites of injection of pine pollen extracts and other irritants.

38635

APTIC NO. 61389

Aichi Prefectural Government (Japan), Environmental Protection Division

ANNUAL REPORT OF PHOTOCHEMICAL SMOGS IN AICHI PREFECTURE, 1972. (Showa 47 nendo Aichi-ken ni okeru kokagaku sumoggu no hokokusho). Text in Japanese. 94p., May 1973.

Photochemical smog incidents in Nagoya City, Aichi Prefecture, are described. A peculiarity of these smog episodes was the reporting of health effects in spite of relatively low oxidant concentrations. During 7 months beginning in May 1972, smog notices were issued 21 times and warnings were given five times. Oxidant concentrations ranged from about 0.07 to 0.19 ppm. Oxidant concentrations were highest early in June, from the end of June to early July, late July to early August, and from the end of August to early in September. Very few cases of health damages were reported during the first episode, but during the period between the oxidant peaks when the concentration was 0.11-0.13 ppm, 149 cases appeared. General symptoms were irritation of the eyes and throat. Most cases were reported about 2 hr before noon and were most often found among children in playgrounds and persons working on the street. Parameters determining the causes of smog were the concentrations of sulfur oxides, oxidants, floating dusts, temperature, and wind variables.

1971

38636

APTIC NO. 60929

Alabert, Nicole

STUDY OF CERTAIN MECHANISMS OF THE TOXIC ACTION OF THREE AIR POLLUTANTS: FORMALDEHYDE, ACETALDEHYDE, AND ACRYLEIN IN THE RAT. (Etude de quelques mecanismes d'action toxique de trois polluants atmospheriques chez le rat: le formaldehyde, l'acetaldehyde, l'acroleine). Text in French. Universite Paul Sabatier de Toulouse (France), Thesis (Ph.D.), Nov. 18, 1971, 116p. 108 refs.

The acute toxicity of formaldehyde, acetaldehyde, and acrolein was studied in rats that inhaled 130 cu cm/cu m formaldehyde, 10,000 cu cm/cu m acetaldehyde, and 90 cu cm/cu m acrolein for 3 hr. Formaldehyde and acrolein caused hepatic steatolysis, while acetaldehyde produced no lipid infiltration. Formaldehyde and acrolein upset the NAD - NADH + H balance, and interfered with the alcohol dehydrogenase and lactate dehydrogenase, while acetaldehyde had no toxic effect in the concentration tested. Hepatotoxicity of acrolein was established in chronic experiments.

38637

APTIC NO. 60656

Gilpin, Alan

MAJOR AIR POLLUTION INCIDENTS. In: Air Pollution, St. Lucia, Australia, University of Queensland Press, 1971, Chapt. 3, p. 13-16, 3 refs.

A number of incidents have occurred in which morbidity and mortality rates have increased dramatically over short periods during which air pollution concentrations have been unusually high. In the Meuse Valley in 1930, prolonged stable weather conditions produced a severe inversion with heavy fog. Many illnesses and deaths were caused by poisonous waste gas from many factories in the valley in conjunction with the unusual climatic conditions. Illness was the result of acute fluorine intoxication aggravated by the immense quantities of suspended soot and particles in the atmosphere. In Donora, Pa. in 1948, very stable weather conditions produced similar effects. Sulfur dioxide and its oxidation products, together with particulate matter, were considered to be the significant contaminants. At Poza Rica, Mexico in 1950, illness and death were caused by the malfunction of an oil refinery sulfur recovery unit whereby large quantities of hydrogen sulfide were vented to the atmosphere. In the London fog of 1952, nearly 4000 people died from (mainly) respiratory and cardio-vascular diseases. The irritants mainly responsible were probably derived from the combustion of coal. Episodes in New York are briefly mentioned.

38638

APTIC NO. 60587

Nelson, Norton

HAZARDS OF MERCURY. INTRODUCTION AND SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS. Environ. Res., vol. 4:4-9, 60-69, 1971. 131 refs.

Findings and recommendations of a study group composed of representatives from several agencies in the United States government visiting Sweden and Finland are presented in relation to the existence of toxic metallic mercury and methylmercury in this country. The problem generally relates to the toxicity of unmodified mercury pesticides and to accumulations of alkylated mercury from a variety of sources in aquatic systems. Overt mercury poisoning appears unlikely from the consumption of fish or other food products normally marketed in the United States. The levels of mercury contamination found in freshwater fish in Sweden and Finland are similar to those found in such fish in the United States where fish consumption is somewhat less. It is nevertheless urgent to determine whether subtle health effects are present and to use all possible means to reduce exposure to mercury immediately. Recommendations are given concerning the review of the adequacy of current regulations, the extent of human exposure, the effects on health, ecological effects, control procedures, analytical methodology and validation, atmospheric and oceanic transport, decontamination programs, research collaboration and program coordination, and review of other toxicants.

38639

APTIC NO. 60640

World Health Organization

HEALTH EFFECTS OF ENVIRONMENTAL COMPONENTS. United Nations Economic Commission for Europe. New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 325-331. 1 ref. (May 2-15.)

The environmental health aspects of the chemical and petrochemical industries, pesticides, transportation, energy production, waste management, aluminum plants, tourism, and metropolitan and regional planning are generally reviewed. The research, personnel training, and objectives of the World Health Organization with regard to the health effects of environmental pollutants are discussed.

1970

38640

APTIC NO. 60605

Ey, W.

POLLENS AND SPORES AS CAUSATIVE AGENTS IN OTORHINOLARYNGOLOGICAL PATHOLOGY. (Pollen und Sporen als Krankheitsursache im Hals-Nasen-Ohren-Bereich). Text in German. Kommission zur Erforschung der Luftverunreinigung (West Germany) and Deutsche Forschungsgemeinschaft, Kolloq. Allerg. Pollen Sporen Darmstadt, West Germany, 1970, p. 78-87. 8 refs. (April 14.)

General problems of pollens and spores as allergens in otorhinolaryngology are described. Following contact with pollens and spores, the organism develops a specific hypersensitivity due to antigen-antibody reactions. Disposition and exposition are the essential requirements for allergy to develop. Allergies of seasonal character, such as hayfever, are mostly acute and of rather short duration, while nonseasonal allergies, such as those caused by house dust, are protracted and chronic. Anosmia and nasal eosinophilia are characteristic features of hayfever. Some 48% of all hayfever patients were sensitive also to allergens other than pollens and spores.

38641

APTIC NO. 60604

Gronemeyer, W. and E. Fuchs

ON THE PROBLEMS OF POLLEN AND MYCOSPORE INDUCED ASTHMA. (Zur Problematik des Pollen- und Pilzsporenasthma). Text in German. Kommission zur Erforschung der Luftverunreinigung (West Germany) and Deutsche Forschungsgemeinschaft, Kolloq. Allerg. Pollen Sporen. Darmstadt, West Germany, 1970, p. 105-116. 2 refs. (April 14.)

Pollen- and mycospore-induced asthma developed in about 30% of all cases of pollinosis after 5 to 15 yr of the classical symptoms in the eye, nose, ear, and larynx areas. The gradual involvement of the lower respiratory organs, mostly across laryngotracheobronchitis and spastic, eosinophilic bronchitis, ends in asthmatic attacks, depending on the actual concentration of pollens and mycospores in the air. Both the frequency and intensity of the asthmatic attacks are positively correlated with the pollen content of the air. Pollen-induced asthma may remain as a sole seasonal affection without manifestations in the otorhinolaryngological area. Conjunctivitis vernalis, tracheitis allergica, juvenile vulvovaginitis, gastrointestinal disorders, seasonal dermatitis, Quincke's edema, seasonal urticaria, arthritic affections, and migrain are other possible symptoms of pollen-induced allergy.

1966

38642

APTIC NO. 69887

Epstein, Samuel S., S. Joshi, J. Andrea, N. Mantel, E. Sawicki, T. Stanley, and E. C. Tabor

CARCINOGENICITY OF ORGANIC PARTICULATE POLLUTANTS IN URBAN AIR AFTER ADMINISTRATION OF TRACE QUANTITIES TO NEONATAL MICE. *Nature (London)*, 212(5068):1305-1307, Dec. 17, 1966. 23 refs.

A bio-assay was developed that uses neonatal mice in a highly sensitive and direct estimation of carcinogenicity as a result of all components in organic extracts of particulate pollutants. Atmospheric Particulates were collected during 1963 with National Air Sampling Network high-volume samplers at Continu-

AIR POLLUTION ABSTRACTS, AUGUST 1974

ous Air Monitoring Program sites in Chicago, Cincinnati, Los Angeles, Philadelphia, New Orleans, and Washington, D. C.; they were combined by sites and extracted with benzene. Tricaprylin suspensions in concentrations of 100 mg/ml were prepared from the organic extracts derived from these annual composites. Swiss mice were injected subcutaneously in the nape of the neck with 0.05 ml of pollutant suspensions on the first day of their life and with 0.1 ml on both the seventh and fourteenth days, yielding a total dose of 25 mg. Toxicity was clearly indicated by death before weaning of between 29 and 61% of the mice given the pollutant extracts, as compared with the death of 16% of the control animals. Substantial sex differences in mortality developed after weaning in some groups; this was largely as a result of the death or destruction of male mice developing obstructive uropathy, a syndrome characterized by perineal ulceration, urinary obstruction, hydronephrosis, and uremia. The overall incidence of tumors in groups treated with pollutants was markedly greater than in the controls. There were also differences in the incidence of tumors for pollutants from city to city. The relatively low tumor yield in the groups receiving extracts from Los Angeles were associated with low photodynamic potencies and low concentrations of benzo(a)pyrene in the corresponding organic extracts; the converse was true for Cincinnati.

38643

APTIC NO. 60896

Ghelberg, N. W., Edith Bretter, Lucia Costin, and Elena Chitul

INVESTIGATIONS ON THE APPEARANCE OF HEINZ'S BODIES UNDER THE INFLUENCE OF SMALL LEAD CONCENTRATIONS IN THE ATMOSPHERIC AIR. (Cercetari cu privire la aparitia corpusculilor Heinz sub influenta concentratiilor mici de plumb din aerul atmosferic). Text in Romanian. *Igiena (Bucharest)*, 15(4):209-219, April 1966.

Laboratory and field investigations of the effects of industrial emissions of lead on the formation of Heinz's bodies in the erythrocytes are reported. In the laboratory, blood was drawn from a healthy adult and placed in two sterile tubes. Increasing concentrations of lead salts were added to one tube and the appearance of Heinz bodies was compared to those in the control tube. Field investigations included sampling blood from schoolchildren living in polluted and non-polluted areas. The samples were analyzed for vitamin C, hemoglobin, methemoglobin, and verdoglobins. Heinz bodies appeared in vitro caused by the toxic action of lead salts, especially lead oxides. Lead salts caused various reactions in the blood chemistry during the field studies, and the appearance of Heinz bodies is attributed to the influence of lead on certain complex metabolic processes instrumental in the formation of bile salts.

38644

APTIC NO. 67733

Maricevic, Ana, A. Hecimovic, B. Mark, and T. Beritic

RESULTS OF THE EXAMINATION OF WORKERS EXPOSED TO HARD METAL DUST. (Rezultati ciljanij pregleda radnika eksponiranih prasini tyrdij metala). Text in Serbo-Croatian. *Arhiv Hig. Rada Toksikol. (Yugoslavia)*, 17(1):55-61, 1966. 15 refs.

The further study of 33 workers exposed to the inhalation of hard metals in a factory producing a certain kind of tile showed a third case of pneumoconiosis. Investigations of the pathogenesis of the disease showed that it was not possible to confirm that an allergic reaction was involved nor that cobalt was the carrier of antigenic properties. The toxic action of cobalt remains unconfirmed.

1965

38645

APTIC NO. 59264

Teisinger, J. and V. Fiserova-Bergerova

PULMONARY RETENTION AND EXCRETION OF MERCURY VAPORS IN MAN. *Ind. Med. Surg.*, vol. 34:580-584, July 1965. 19 refs.

Five experiments were carried out in an exposure chamber, in which experimental subjects inhaled mercury vapors in a concentration of 100 micrograms/cu m for 7 hr (in one case, 200 micrograms/cu m was used). A retention of 76% was found in nasal inspiration and mouth expiration, while retention decreased up to 20% in mouth inhalation. Retention was constant from the beginning of the experiment. In people who had worked with Hg for many yr, retention was unchanged. Mercury is retained predominantly in respiratory tracts (no Hg was found in alveolar air). Pulmonary desaturation is low and rapid in comparison with solvents. Mercury excretion in urine is protracted and irregular, and thus the absorbed amount cannot be estimated. (Author abstract)

1964

38646

APTIC NO. 60758

Knoll, M., J. Eichmeier, and R. W. Schoen

PROPERTIES, MEASUREMENT, AND BIOCLIMATIC ACTION OF SMALL MULTIMOLECULAR ATMOSPHERIC IONS. *Advan. Electron. Electron Phys.*, vol. 19:177-254, 1964. 377 refs.

The properties, measurement, and bioclimatic action of small multimolecular atmospheric ions are reviewed. Topics covered include: the formation and aging process of small air ions; technical ion generators; methods and devices for measuring the concentration and physical properties of atmospheric small ions; results from investigations on ion concentration and ion mobility; the influences of ions on various biological systems in humans, animals, and plants; therapeutic actions of atmospheric ions; and working hypotheses of air ion action on organisms. There appear to be a considerable number of accurate methods and highly sensitive instruments available for investigation of physical and biological actions of natural and artificially produced air ions, and it is possible to produce a defined concentration of air ions with known polarity and known mobility; measurement of local distribution of ions is also feasible. The intense action of ions on biological systems has been observed in many cases but without a sufficient mechanism as yet to explain all of the effects recorded. There is no adequate explanation for the fact that a very small percentage of ionized water molecules can exert such strong biological influences as, for instance, a change of 50% in ciliary frequency of man.

1962

38647

APTIC NO. 60552

Pace, Donald M., James R. Thompson, and W. A. Van Camp

EFFECTS OF OXYGEN ON GROWTH IN SEVERAL ESTABLISHED CELL LINES. *J. Nat. Cancer Inst.*, 28(4):897-909, April 1962. 23 refs.

Studies were made on the effects of various oxygen concentrations on four established cell lines: strain L cells, mouse liver epithelium cells, HeLa cells, and human skin. In 100% oxygen, some strain L cells survived up to 14 days; mouse liver cells up to 9 days; HeLa cells, 3 days; and human skin cells, 8 days. There was practically no proliferation in 100% O₂, and all liver, HeLa, and skin cells died before termination of the experiment. In 95% O₂ and 5% carbon dioxide, the only significant proliferation was in the strain L cultures; all others decreased in number and finally died out. Of the four lines tested, human skin and HeLa cells appeared to be more sensi-

tive to high O₂ tensions than strain L or mouse liver cells. Cell proliferation in the presence of CO₂ and 95% nitrogen was not as severely inhibited as that in 100% N₂. The roles of O₂, CO₂, and N₂ in cell growth and cell metabolism were investigated to determine basic information in cancer research. (Author summary modified)

EFFECTS-PLANTS AND LIVESTOCK

1974

38648

APTIC NO. 61595

Bazzaz, F. A., G. L. Rolfe, and P. Windle

DIFFERING SENSITIVITY OF CORN AND SOYBEAN PHOTOSYNTHESIS AND TRANSPIRATION TO LEAD CONTAMINATION. *J. Environ. Quality*, 3(2):156-158, April-June 1974. 15 refs.

The effect of lead contamination of the photosynthesis and transpiration rates of corn and soybean plants was investigated. The plants were grown in media containing a range of Pb concentrations, supplied as lead chloride, and showed a decrease in activity with increasing Pb treatment levels. At lower Pb treatment levels, corn appears to be more sensitive than soybeans. At high treatment levels (62.5-150 mg/plant) soybeans are more sensitive than corn. At 250 mg Pb/plant in the medium, photosynthesis is only 10% of maximum in soybeans, but 47% in corn, even though corn Pb tissue content is much higher than that of soybeans. Transpiration exhibited similar trends to photosynthesis suggesting that, especially in corn, an appreciable part of the inhibition of the two processes is related to increased stomatal resistances with increased Pb concentrations. Lead accumulation trends were similar at treatment levels of 0 to 62.5 mg/plant, but were slightly different at higher levels. The total amount of Pb accumulated was higher in corn than in soybeans. Maximum accumulation in both species occurred at 62.5 mg Pb/plant. (Author abstract modified)

38649

APTIC NO. 61350

Bazzaz, Maarib Bakri and Govendjee

EFFECTS OF LEAD CHLORIDE ON CHLOROPLAST REACTIONS. *Environ. Letters*, 6(3):175-191, 1974. 37 refs.

The effects of lead chloride on chloroplast reactions were investigated at various pHs. In maize chloroplasts, PbCl₂ causes inhibition or stimulation of photosystem II activity depending on the pH of the reaction media. At pH 7.8, an inhibition of 16-39% with 0.75 nM to 9 mM PbCl₂ is observed. At pH 6.5, however, a stimulatory effect of 20% is observed with 9 mM PbCl₂. This effect is not due to the uncoupling of photophosphorylation, or to the ability of PbCl₂ to donate electrons to photosystem II. It is suggested that there is a common site of inhibition between water and Z (the primary electron donor of photosystem II) for lead treatment and Tris-washing of chloroplasts. Lead salts at both pH 6.5 and 7.8 induced about 20% inhibition of the variable chlorophyll a fluorescence even in the presence of 10 micrometer 3-(3,4-dichlorophenyl) 1, dimethylurea. Room temperature and 77 K chlorophyll an emission spectra show an increase in the ratio of pigment system I to II fluorescence upon the addition of lead salts at both pHs -- an effect opposite to that induced by salts of other divalent ions. Lead salts (0.9 mM to 9 mM) cause 10 to 20% increase in the 540 nm absorbance change, reflecting a decrease in spaces between thylakoids, over that of untreated chloroplasts. Lead-induced conformational changes in thylakoid membranes of chloroplasts, leading to changes in energy distribution between pigment systems I and II, is suggested to explain the above results. (Author abstract)

193

STUDIES CONCERNING THE ENRICHMENT OF HEAVY METALS IN TILLED AND UNTILLED SOILS. (Untersuchungen ueber Anreicherungen von Schwermetallen in Boeden mit und ohne Bearbeitung). Text in German. Staub, Reinhaltung Luft, 34(1):22-23, Jan. 1974. 5 refs.

In the neighborhood of a heavy metal emission source three plots of untilled land of three sq m were staked out at distances of 300, 600 and 900 m from the plant. The plots were located in the main wind direction. Agriculturally used land was used for comparison. Soil samples were taken at the end of the growing season for three years. The agriculturally used soil measured lower zinc concentrations at a depth of 15 cm than the untilled soil. In the top layer it was nearly half as high as that in untilled soil. This difference diminished with increasing distance from emission source. The cadmium concentration of the soil was influenced less by air pollution than the Zn concentration. At a depth of zero to 5 cm and a distance of 300 m from the plant the highest Cd concentrations were measured in untilled soil.

STREET DUST HEATS UP PLANTS. (Strassenstaub heizt Pflanzen auf). Text in German. Umschau Wiss. Tech., 74(9):283-284, 1974. 2 refs.

Traffic in urban streets gives rise to a heavy load of dust on nearby plants. Absorptivity of solar radiation for wavelengths from 750 to 1350 nm by plant leaves is changed toward greater values and leads to the possibility of heat stress. This influences productivity and thus vitality of such plants. Periods with rainy days and snowfall have some cleaning effect, but leaves cleaned by washing with water show restitution of disadvantageous dust within some days. Raised values of reflectivity for wavelengths from 400 to 750 nm tends to lower photosynthesis.

HEAVY METALS AS AIR POLLUTANTS- LEAD -ZINC -CADMIUM - INFLUENCE ON THE VEGETATION. (Schwermetalle als Luftverunreinigung - Blei, Zink, Cadmium - Beeinflussung der Vegetation). Text in German. Staub, Reinhaltung Luft, 34(1):1-7, Jan. 1974. 69 refs.

The effects of lead, zinc and cadmium on plants are discussed. Application of fly dust containing lead and zinc to string bean plants produced chloroses on the leaves with zinc containing dusts and additional necroses with lead containing dusts. When added to the soil lead had a growth retarding effect. The yields of potatoes and tomatoes grown in sandy soil polluted with lead and zinc were much smaller than that of clayey soil. Increasing hydrolytic acidity of the soil promotes the lead intake by the plant. Tomatoes and string beans grown in the industrial area of Hamburg in the immediate vicinity of a heavy metal-emitting plant were harvested in much lower quantities than on a control field outside the industrially polluted area. In the vicinity of metallurgical plants the concentrations of metallic pollutants are dangerously high. Near a copper plant 1280 to 290 ppm Pb, 490 to 215 ppm Zn, and 1685 to 216 ppm Cu were measured in grass depending on the distance from the plant. In the neighborhood of a zinc plant the grass measured 1700 to 785 ppm Pb, 3030 ppm Zn (400 m distance), and 980 ppm Zn (1800 m distance). The normal concentrations of Pb, Zn and Cd in vegetables are listed. For example, for grass the normal Pb concentration is 0.3 to 1.5 ppm (measured in Scotland) which rises in late fall to 10 ppm, in the late winter to 30 or 40 ppm and then drops again. Apart from the different toxicity of these pollutants to different kinds of plants there are side effects of heavy metals on plants such as the blocking of the intake of important nutrients.

EFFECTS AND INJURIES BY LEAD, CADMIUM, AND ZINC ON DOMESTIC ANIMALS. (Wirkungen und Schaeden durch Blei, Cadmium und Zink bei Nutztieren). Text in German. Staub, Reinhaltung Luft, 34(1):8-10, Jan. 1974.

Different kinds of animals respond quite differently to lead, cadmium, and zinc. Cattle, for instance, are highly sensitive to lead followed by sheep and goats, while pigs, dogs, and poultry are rather insensitive to lead. Heavy metals impair the activity of important enzymes both in the human as well as in the animal organism. A lead concentration which blocks 90% of the activity of a dehydratase in the blood of cattle inactivates only 10% in the blood of dogs and pigs. Between humans and animals the qualitative effect of the heavy metals is the same. The lead ingested by cattle tends to be stored mainly in the liver and kidneys. It moreover accumulates in the bones and hair of the animals. Injuries of cattle and sheep occur when the animals ingest more than 5 mg Pb/kg body weight/day. The pathogenic effects of lead are well known and are reviewed here. Much less is known about the effects of cadmium. In pigs, Cd impairs the metabolism of the skin and causes parakeratosis. In various other animals reproduction becomes difficult or impossible. As in humans, Cd is stored in the organism of animals and the concentration increases with age. The kidneys of older cattle may contain 40 ppm Cd, in some cases as much as 400 ppm. Cadmium impairs zinc metabolism and prevents Zn distribution in the organism. Unlike Cd, Zn is not stored in the organism. It is toxic if ingested in high concentrations but only for as long as it takes to be discharged again. It is easily eliminated.

STUDIES ON THE INTAKE ABILITY OF CARBON MONOXIDE OF MICROORGANISMS IN SOIL, PART 1. (Dojo biseibutsu no CO sesashu noryoku ni kansuru kenkyu (I)). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(1):105, April 1974. (Presented at the Japan Society of Hygiene, Annual Meeting, Nagasaki, Japan, April 2-4, 1974. Paper 210.)

The oxidation of carbon monoxide by soil microorganisms was investigated. The fate of 1% CO in a closed vessel containing untreated volcanic ash was compared to a control containing heat-sterilized soil. The concentration of CO decreased to zero after 5 days, and added CO was reduced to zero after only 2 days. There was no decrease in the control. After four additions of CO the conditions became anaerobic as carbon dioxide increased. The CO-consuming organism was a gram-negative small bacillus the activity of which increases with addition of amino acids and decreases with ferric chloride is taken out of the culture. It is assumed that the bacillus oxidized the CO to CO₂. The activity of such a microorganism probably accounts for the fact that CO does not accumulate in the atmosphere.

FLUORINE CONTENT OF THE MILK FROM COWS IN THE REGION OF ALUMINUM PLANTS. (Zawartosc fluoru w mleku krow z okolic huty aluminium). Text in Polish. Roczniki Panstwowego Zakladu Hig., 25(1): 97-103, 1974. 21 refs.

The fluorine content in the milk of cows from farms situated 2-3 km from aluminum plants was determined. The experiments covered the area where fluorine contamination of air, rain water, and green forage was found. Fluorosis occurred in 79.4% of the cows under investigation. Fluorine was isolated from milk by a microdiffusion technique and determined colorimetrically with alizarin complexonate and lanthanum nitrate. A marked increase (P greater than 0.001) was found in

the fluorine content of milk from the cows exposed to fluorine (88.1 micrograms/100 ml) compared with that from the controls (35.5 micrograms/100 ml). In addition, seasonal variation in the fluorine content of milk was connected with the amount of precipitation and with variations of fluorine content in green forage. The highest values were in winter months (117.9 micrograms/100 ml), and the lowest ones were in June (63.8 micrograms/100 ml). The fluorine content in milk, up to 100 micrograms/100 ml (equal to 1 ppm) seemed to have no adverse effect on people and animals, since it did not exceed the permissible limits for fluorinated water, while some hazard may be expected in about 5% of the cows with fluorine content of milk exceeding 200 micrograms/100 ml (equal to 2 ppm).

38656

APTIC NO. 61158

Kirkham, M. B. and D. R. Keeney

AIR POLLUTION INJURY OF POTATO PLANTS GROWN IN A GROWTH CHAMBER. *Plant Disease Repr.*, 58(4):304-306, April 1974. 13 refs.

Damage to potato plants (*Solanum tuberosum* Russet Burbank) in the form of symptoms suggestive of air pollution injury was noted after 22 days of planting during an experiment in a growth chamber designed to evaluate the rate of nitrate uptake. Symptomatology included: a curling downward of mature leaflet edges and the appearance of interveinal yellow enations on the upper surface of the leaflets. Purification of the chamber's incoming air source with activated charcoal eliminated the onset of the symptoms which were similar to many of those caused by ethylene. The damage-causing pollutant was suspected to be either an ethylene derivative or the result of ethylene acting synergistically with another compound. (Author abstract modified)

38657

APTIC NO. 61492

Kloke, Adolf

LEAD, ZINC, CADMIUM, ENRICHMENT IN SOILS AND PLANTS. (Blei-Zink-Cadmium, Anreicherung i Boeden und Pflanzen). Text in German. Staub, Reinhaltung Luft, 34(1):18-21, Jan. 1974. 41 refs.

The normal lead concentration of the lithosphere was 16 ppm as earlier literature reports, that of the soil between 2 and 20 ppm and that of plants less than 10 ppm. Along traffic routes the lead concentration generally doubles or triples to 20 to 30 ppm, at the most it rises by five to tenfold. Under unfavorable conditions values from 100 ppm up to 1000 ppm were measured in the dry mass of plants. About 30 to 70% of this quantity can be washed off. In the vicinity of lead plants concentrations of 400 to 1200 ppm were measured. The normal zinc concentration of mineral soil amounts to 10 to 300 ppm and healthy plants contain 20 to 100 ppm zinc. In the vicinity of a zinc plant the Zn concentration of the soil rose to between 900 and 1500 ppm. In the vicinity of lead/zinc plants in Wales the zinc concentration in soils was found to be 100 to 1300 ppm and of plants 20 to 360 ppm. In Pennines Zn concentrations of 800 to 1300 ppm were recorded in soil and of 400 to 14000 ppm in lichen. In the vicinity of traffic routes the Zn concentration of soil and plants also rises. For example 192 ppm Zn were measured in the soil at 8 m distance from a street and 41.2 ppm in grass. The Cd concentration of the lithosphere is 0.18 ppm, of non-polluted soil 0.01 to 0.2 ppm, of plants 0.2 to 0.5 to 3 ppm in the dry substance. Cadmium is emitted by industries, by the combustion of fuel oil and coal and by diesel oil-operated automobiles. At 8 m distance from a traffic route in the U. S. 1.45 ppm Cd were measured in the soil. Canadian investigations show that the Cd concentration at 15 m distance from an industrial plant was 44 ppm and higher by a factor 100 than at 90 m distance where 0.45 ppm were measured.

38658

APTIC NO. 61452

Kratky, B. A., E. T. Fukunaga, J. W. Hylin, and R. T. Nakano
VOLCANIC AIR POLLUTION: DELETERIOUS EFFECTS ON TOMATOES. *J. Environ. Quality*, 3(2):138-140, April-June 1974. 6 refs.

The possible relationship between volcanic fumes and poor tomato crops was investigated in the Kona district of Hawaii. From the winter of 1969-70 to the summer of 1973, severe yield and quality reductions occurred on field grown tomatoes (*L. esculentum* Mill). There was a definite atmospheric haze at the time caused by fumes from active and degassing vents located 75 km away and associated with Kilauea Volcano. Tomato plants under plastic rainshelters grew normally. Since rainwater was suspected of causing the symptoms, it was analyzed and found to be acidic (pH 4.0) and to contain appreciable quantities of chloride and sulfate ions plus 27 detectable organic compounds in the ppb range. When tomato leaf discs were immersed in rainwater samples, more calcium, magnesium, and potassium were leached from these acidic samples than from less acidic rainwater samples and the distilled water controls. In a pollen germination medium containing rainwater, pollen germination and tube lengths decreased as the pH of the rainwater decreased. However, since increasing the pH of the acidic Kona rainwater with sodium hydroxide did not increase pollen germination, factors other than pH are suspected to cause poor pollen germination. (Author abstract modified)

38659

APTIC NO. 61490

Michels, Sabine, Gerd Croessmann, and Gerhard Scholl

THE CONTAMINATION OF FOOD WITH HEAVY METALS. (Ueber die Kontamination von Nahrungsmitteln mit Schwermetallen). Text in German. Staub, Reinhaltung Luft, 34(1):23-26, Jan. 1974. 12 refs.

In the years 1970 and 1971 vegetables grown in vegetable gardens in the vicinity of a heavy metal plant were analyzed with regard to the concentrations of zinc, lead and cadmium. The vegetable samples were washed, shredded and dried at 65 C. After dry ashing zinc was determined in a hydrochloric acid extract by atomic absorption spectrophotometry and lead and cadmium by stripping voltametry. It was found that the zinc quantity ingested with one single meal was higher than the daily requirement of 6 mg. For example with 250 g head salad more than 20 mg zinc could be ingested. The vegetables also contained a lead concentration which was far in excess of normal quantities. With one meal the toxic threshold limit value of 2 mg/day could be exceeded. Underground parts of plants and vegetables contained less lead than above ground parts. In 66% of the vegetables examined in 1970 determinable quantities of cadmium were found; 61% of the measured concentrations were above 0.3 ppm, 5% below this value. The average concentration was 0.98 ppm Cd. Head salad contained the highest Cd concentrations with up to 5.5 ppm. Of the vegetables examined in 1971, 15.5% contained measurable Cd quantities, the lowest concentration measured was 0.5 ppm. The average concentration measured in 1971 was 2.34 ppm.

38660

APTIC NO. 61325

Terakado, K. and H. Fukuda

ON THE FUNCTION OF THE CONTROLLED-CONDITION ROOM WHERE PLANTS ARE EXPOSED TO SEVERAL CONDITIONS OF AIR POLLUTION (ENVIRONMENT SIMULATION ROOM). (Kankyo bakuro-shitsu no kino). Text in Japanese. Tokyo Metropolitan Agricultural Experiment Station, p. 24-26, Feb. 1974.

Plants were studied for use as indices of air pollution. Index plants were studied for adaptability to the environment and to air pollution, susceptibility to air pollution (especially to oxidants), ability to grow anywhere, and ability to change factors of the outdoor environment. Rooms were devised to hold plants during exposure tests. These would automatically irrigate the soil, give artificial rainfall and other weather conditions, automatically supply pollution, and automatically determine the air pollution.

38661

APTIC NO. 61496

Vetter, Heinz

POLLUTION AND INJURIES BY HEAVY METALS IN THE VICINITY OF A LEAD AND ZINC PLANT IN LOWER SAXONY. (Belastungen und Schaden durch Schwermetalle in der Nahe einer Blei- und Zinkhütte in Niedersachsen). Text in German. Staub, Reinhaltung Luft, 34(1):10-11, Jan. 1974. 2 refs.

The dusts emitted at 1 to 3 km distance from the lead and zinc plant in Lower Saxony from 1971 on contained about 15% Zn, 12% Pb, 1.4% fluoride, 0.2% copper, 0.15% arsenic and 0.09% cadmium. During the time of filter break-down in spring 1972 the average Pb concentration at 1.5 km distance was about 12 mg and after repair of the filter 1 mg/sq m/day. Systematic measurements of the lead and zinc concentration in soil and plants to a distance of 12 km revealed that the lead and zinc concentrations in soil were up from the normal 10 ppm to 34 ppm Pb and 70 ppm Zn. At 12 km distance the grass contained in April about 100 times higher and in May about 10 times higher Pb concentrations than normal. At 1 km distance the Pb concentration in the grass rose to 23,000 ppm in April, dropped to 2000 ppm in May and to 50 ppm in September. The Zn concentration rose to 7000 ppm in April and dropped by September to 1000 ppm. Injuries of cattle observed in the vicinity of the plant were found to be mainly due to the zinc and lead ingested with the food. Feeding experiments with a Zn concentration triple the concentration of lead showed that Zn was more harmful than lead. Concentration limits for Zn are therefore as important as those for lead.

38662

APTIC NO. 61241

Yoshiike, Akio

ENVIRONMENTAL DIAGNOSIS BY SOIL POLLUTION-STATE OF POLLUTION BY HEAVY METALS AND PESTICIDES. (Dojo osen kara mita kankyo shindan-Junkinzo, noyaku ni yoru osen no jokyō). Text in Japanese. Kankyo Sozo (Environ. Creation), 4(1):84-89, Jan. 1974.

The sources of soil pollution in Japan are believed to be 80% by industrial liquid waste and 13% by industrial combustion gases. The major pollutants are heavy metals such as copper, zinc, cadmium, lead, and arsenic, and these cause singly or in combination damages to agricultural produce. The most serious of pollutants are copper and zinc, but their single damaging effects are not as serious as single effects of Cd or As. Pollutants other than heavy metals are organochlorine pesticides, polychlorinated biphenyls, and alkyl benzene sulfonates. The history of zinc pollution is the oldest in Japan and liquid waste and stack gases from zinc mines and refineries have damaged produce seriously for many centuries. These areas are simultaneously damaged by Cd, and countermeasures for Cd pollution are urgently needed. The measures against Cd pollution will naturally control Zn pollution effects. The damages to produce by Pb are smaller than damages by Cu or Zn, and usually serious damage occurs in combination with Zn or Cu. In addition to stack gases and mine waste, soils along highways are polluted by automotive emissions. The extent of damages in Pb in automotive emission is difficult to determine at the moment. Toward control measures, the ministries of Health and Welfare and Agriculture conducted in 1970 and 1971. Thorough emergency investigations of environmental pollution in the vicinities of mines and refineries.

38663

APTIC NO. 61478

Tokyo Metropolitan Research Inst. for Environment Protection (Japan)

THE OUTLINE OF REPORTS ON STUDIES OF PHOTOCHEMICAL SMOG EFFECTS UTILIZING A PLANT, MORNING GLORY. (Asagao ni yoru kakagaku sumoggu eikyo chosa ni kansuru kenkyu hokoku no gaiyo). Text in Japanese. 18p., March 1974.

AIR POLLUTION ABSTRACTS, AUGUST 1974

The experiments were conducted on two different morning glories through the cooperation of teachers and students of 77 junior high schools in Tokyo and three schools in the surrounding areas. The sample scarlet morning glories and violet morning glories were about 15 cm tall and were planted between May 23-31. Results showed that damages to the plant were observed when the oxidant dose was higher than 60 ppm/hr; the difference of outdoor oxidant effect between the two plants was little compared to that of indoor ozone exposure; there were 3% damages on scarlet morning glories on July 2 and 53% on July 5 at oxidant dose 10 ppm; most of the damaged plants had white spots and necrosis; the control plants either showed minor damage or had no damage at all.

1973

38664

APTIC NO. 61143

Bohne, Helmut

BRIEF REPORT: EFFECTS OF DUST IMMISSIONS ON PLANTS. (Kurzmittellung: Wirkungen von Staubbimmissionen auf Pflanzen). Text in German. Staub, Reinhaltung Luft, 33(12):489-491, 1973. 5 refs.

A number of examples of industrial dust emission causing a plant damage are described. A lime containing cement work dust formed a thick white crust on plant needles and leaves, preventing normal growth. Zinc and lead containing dust emitted from a zinc plant burned the leaves in an orchard two km away. Lime containing dust with an ashing loss of 50 to 60% from a soft coal processing plant reduced the yield of a nearby rye crop by 3 tons/hectare and that of a sugar beet crop by 50%. Soot, with an ashing loss of 99.9% and particle size of 15 to 100 microns, coats entire plants with a thin film, leading to their eventual decay.

38665

APTIC NO. 60454

Davies, B. E.

OCCURRENCE AND DISTRIBUTION OF LEAD AND OTHER METALS IN TWO AREAS OF UNUSUAL DISEASE INCIDENCE IN BRITAIN. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 125-134, May 1973. 15 refs. (Oct. 2-6.)

The occurrence of lead, zinc, copper, and cadmium in the soil, radishes, and water of two metal mining areas of Britain, namely, Cardiganshire and the Tamar Valley, was investigated. Cancer and other diseases are unusually prevalent in these areas. The total and plant-available metals are enriched in soils of the mineralized zones, and Pb is unusually high in the unpolluted soils. Enhanced amounts of heavy metals are entering the food chain through vegetables and drinking water, but the significance of this is uncertain. (Author summary modified)

38666

APTIC NO. 60807

Heck, Walter W.

AIR POLLUTION AND THE FUTURE OF AGRICULTURAL PRODUCTION. Advan. Chem. Ser., no. 122:118-129, 1973. 18 refs.

The relationship between air pollution and future agricultural production is examined in terms of the difficulty of assessing the consequences of pollution, predicting economic loss to vegetation, and identifying the pollutants responsible for plant damage. The most widespread and pervasive pollutants affecting agricultural production include ozone, sulfur dioxide, other oxidants, fluoride, and ethylene; trace elements present in exhaust gases, pesticides, and gases such as ammonia and chlorine are also suspected as being a threat to plant life. No method is available for predicting the economic loss to vegetation from air pollutants, and surveys to date have not found a way to incorporate the impact of pollutants on the growth and

yield of crops where visible injury is not recognized. The impact of pollutants on plant communities in terms of species composition, frequency, presence, total biomass, or quality of product after long term exposures appears to be an area of ultimate concern where future research should be directed. Tobacco is an example of a single crop agricultural community on which the effects of ozone have long been recognized. Community studies must be approached from an effects modeling standpoint if any long term understanding of air pollution effects on ecosystems is to be attained. A look at the future indicates that agronomic and other cultivated species would not be acutely impaired if tomorrow's oxidant and sulfur dioxide levels remain as they are today, although the potential effect of an increase in such pollutants is difficult to forecast.

38667

APTIC NO. 58557

Honma, Shin, Keitaro Nakatani, Ryoitsu Sato, and Hiroshi Yawata

MEASUREMENTS OF HEAVY METAL CONTENTS IN THE 1972 UNPOLISHED RICE CROP IN THE KOSAKA TOWNSHIP. (Kosakacho 47-nen san genmaichu no jukinzoku ganyuritsu sokutei kekka ni tsuite). Text in Japanese. Chutsu Byoin Iho (Bulletin of Chu-tsu Hosp.) (Akita), 14(7):80-81, 1973.

The heavy metal content in the soil and unpolished rice in the Kosaka refinery area were examined. Since the area is in no way connected with industrial water, the route of pollution was determined as the refinery smoke and mining dusts. The soil was sampled, dried, sifted, weighed, degraded by nitric acid and perchloric acid, and separated. Heavy metals, cadmium, zinc, lead, and copper were measured by atomic absorption spectrophotometry. The rice and plants were dried, weighed, and extracted by MIBK, and heavy metals were measured by spectrophotometry. In the upper stream of the Hosokoshi mining area, the soil near the exit of the mine contained 21.1-2.6 ppm of Cd, 112-232 ppm of Zn, 102-120 ppm of Pb, and 40-60 ppm of Cu. The vertical distribution of heavy metals showed a heavy distribution down to the depth of 25 cm, and heavy metal content under that layer was extremely low. But the field where some deep tilling was done, Cd and Zn were detected down to 60 cm, with the maximum content at 50 cm, and the maximum content of Pb and Cu in the 40 cm layer. Unpolished rice contained the maximum of 0.92 ppm of Cd and minimum of 0.12 ppm. More than 50% had 0.4 ppm. Among the vegetables, spinach contained 4.3 ppm of Cd, red radish, 2.4 ppm, and radish, 1.2 ppm.

38668

APTIC NO. 61300

Iijima, T.

INVESTIGATION AND STUDIES ON PLANT DAMAGE DUE TO TOKYO PHOTOCHEMICAL SMOG. PART I: PRELIMINARY INVESTIGATION ON PLANT DAMAGE DUE TO PHOTOCHEMICAL SMOG. (Tokyo kokagaku sumoggu no shokubutsu higai ni kansuru chosa kenkyu. 1. kokagaku sumoggu ni yoru shokubutsu higai ni kansuru chosa). Text in Japanese. Tokyo-to Nogyo Shikenjo Kenkyu Nenpo (Annu. Rep. Tokyo Met. Agr. Exp. Sta.), 1972:1-2, Oct. 1973.

Plant damage in Tokyo due to photochemical smog is reviewed. In April 29, 1973, spinach and turnip plants were damaged by oxidants, and about 10 species of wild plants were damaged. From the end of Aug. to Sept., Japanese radishes were damaged. During five occasions of plant damage, the air oxidant concentration was abnormally high before the onset of the damage. In these cases, radishes were most seriously damaged, followed by Japanese radishes, point head Chinese cabbage, corn, and no damage on chard. A small protective effect of methyl-1-butylcarbamoyl-2-benzimidazole carbamate to ozone damage occurred. The damaged leaves of 15 species had palisade parenchyma damage with deformation and degradation of the cell walls or discoloration of intracellular substances specific to ozone damage.

38669

APTIC NO. 60455

Impens, R., Z. M. Vunzu, and P. Nangniet

DETERMINATION OF LEAD ON PLANTS GROWING ALONGSIDE HIGHWAYS. (Determination du plomb sur les vegetaux croissant en bordure des autoroutes). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 135-143, May 1973. 11 refs. (Oct. 2-6.)

During the summer of 1971, vegetation and soil samples were taken along motorways and from a control zone, and their lead was measured by means of an imposed voltage oscillographic technique. The Pb concentrations varied according to the traffic density, the degree of proximity, the orientation relative to the prevailing winds, and the type of vegetation. The results reveal a high risk of Pb contamination of fodder and of certain green vegetables growing near (0-35 m) to the highway.

38670

APTIC NO. 61368

Jenner, Edward Levant

SELECTED THIADIAZOLO(3,4-D)PYRIDAZINE COMPOUNDS FOR PROTECTING PLANTS AGAINST AIR POLLUTION. (du Pont de Nemours (E. I.) and Co., Wilmington, Del.) U. S. Pat. 3,758,288. 3p., Sept. 11, 1973. (Appl. April 13, 1971, 3 claims).

A new class of compounds, thiadiazolo(3,4-d)pyridazines, has been invented to protect plants against the deleterious effects of pollutants occurring in the air, particularly the photochemical oxidants such as ozone and peroxyacetyl nitrate. The manufacturing method and methods of application of the compounds to plants are described.

38671

APTIC NO. 60760

Jones, L. H. P. and D. W. Cowling

THE EFFECTS OF SOME AIR POLLUTANTS ON FARM ANIMALS. Preprint, National Society for Clean Air, Brighton (England), 18p., 1973. 32 refs. (Presented at the National Society for Clean Air, Annual Conference, 40th, Torquay, England, Oct. 15-19, 1973.)

A review is presented on the effects of fluorides and various metal dusts on farm animals. Fluorides reportedly cause more damage to domestic animals than any other air pollutant on a world-wide basis. The fluoride content of forage plants growing in air polluted with the halogen compounds greatly increases either through the absorption of gaseous fluoride (hydrogen fluoride) or by deposition of particulate fluorides; concentrations as high as 292 ppm are reported for grass on a farm in Stoke-on-Trent. The most sensitive sign that an animal is absorbing high amounts of fluoride is mottling of the teeth which occurs with intakes too low to produce the symptoms of more severe fluorosis. Arsenic toxicosis in sheep and cattle grazing in the vicinity of copper smelters is a problem particularly evident during the first 40 years of the present century. Industrial molybdenosis, a more recent problem, results in progressive emaciation, accompanied in all cases by diarrhea; high intakes of molybdenum antagonize the metabolism of copper, especially in the presence of high sulfate intake. Post mortem examinations of cattle and horses grazing in lead-contaminated areas indicate high concentrations of both lead and cadmium in the kidney, suggesting that both elements are involved.

38672

APTIC NO. 61151

Kawamatsu, E. and K. Ashikawa

INVESTIGATION AND STUDIES ON PLANT DAMAGE DUE TO TOKYO PHOTOCHEMICAL SMOG PART IV: EFFECTS OF AIR POLLUTION ON FRUIT TREES. (Tokyo kokagaku sumoggu no shokubutsu higai ni kansuru chosa kenkyu; 4. kaju ni taisuru taiki osen no eikyo). Text in Japanese. Tokyo-to Nogyo Shikenjo Kenkyu Nenpo

(Annu. Rep. Tokyo Met. Agr. Exp. Sta.), 1972:4, Oct. 1973.

In order to confirm the symptoms of pear trees which appeared in 1971, aqueous solutions of sulfuric, nitric and hydrochloric acids of concentrations of 0.1, 0.2, 0.5, 1, 2 and 5 N were respectively sprayed on pear trees. It was observed that (1) sulfuric and hydrochloric acid caused chlorosis on leaves three- four days after the spray even at the concentration of 0.1 N and they made brown lesions with the transparent center due to burning and peripheral chlorosis at 0.2 N, and (2) nitric acid gave brown- colored lesions on the leaf surface increasing in area with the increase of concentration from 0.1 N. At 1 N the center of the lesion became transparent due to burning.

38673

APTIC NO. 60506

Majerus, P. and S. Denaeyer

CONTRIBUTION TO THE STUDY OF THE POLLUTION OF THE BRUSSELS URBAN ECOSYSTEM BY HEAVY METALS. (Contribution à l'étude de la pollution de l'écosystème urbain Bruxellois par les métaux lourds). Text in French. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1121-1127, May 1973, 9 refs. (Oct. 2-6.)

Leaves taken from Robinia pseudoacacia L. at 2.50 height, and from Platanus hybrida Brot. at 3.50 m height at sites with different traffic densities in Brussels at the end of the dry summer of 1971 were analyzed for lead, silica, iron, and other heavy metal contents by atomic absorption spectrophotometry. The Pb contents in locust leaves taken from sites with heavy traffic, moderate traffic, light traffic were in the respective ranges of 340-129 mg/kg dry weight, 120-61 mg/kg, and 88-27 mg/kg. Locust leaves taken from parks contained 35-72 mg of Pb per kg. The Fe contents in leaves taken from the four different sites were in the ranges of 3720-1140, 1480-850, 910-200, and 1030-440 mg/kg, respectively. Correlation factors of 0.98; 0.95; 0.95, and 0.92 for the Pb-Fe concentrations, Pb-copper concentrations, Pb-zinc concentrations, and for the Pb-SiO₂ concentrations were obtained. Close correlation between the Pb contents in the leaves and the amount of traffic was established. Washing the leaves eliminated over 50% of the Pb accumulated.

38674

APTIC NO. 58579

Nakagawa, Yoshihiro, Hidekatsu Mitsugi, Noritoshi Takata, and Hiroshi Watanabe

ON THE ACCUMULATION OF HEAVY METALS IN PLANTS. (Jukinzoku-to no shokubutsu e no torikomi ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):314, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 62.)

Accumulation of toxic metals in plants caused by air pollution was investigated in the vicinities of a steel industry and non-ferrous metal industries. The tree leaves were sampled, cleansed, burned to ashes at a low temperature, dissolved in dilute nitric acid, and measured by atomic absorption spectrophotometry. The trees examined were paulonia, cherry, plane, and ginkgo, and the metals extracted were iron, manganese, zinc, cadmium, and lead. All heavy metals were accumulated in leaves approximately in direct proportion to the amount of metals in the air. The Fe concentration in leaves decreased in proportion to the distance from the emission source, but Mn tends to increase with the distance. The relationship between these accumulations and Fe and Mn in the soil was not clear. All Cd, Pb, and Zn concentrations in leaves decreased in proportion to the distance from the emission sources. Cadmium in soil showed the same tendency as leaves, but Pb and Zn content in the soil fluctuated.

198

38675

APTIC NO. 60458

Rameau, J. Th. L. B.

LEAD AS AN ENVIRONMENTAL POLLUTANT. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 189-197, May 1973, 26 refs. (Oct. 2-6.)

The contamination of plants and soil by lead from tetraethyl lead in gasoline is reviewed. Leafy vegetables should not be grown near roads. Lead content of roadside grass in the Netherlands is not yet high enough to cause Pb poisoning in cattle, but it is not recommended that they be fed this grass. Measurements of Pb in roadside plants, roadside soils, and normal plants are listed. The sampling and analytical methods for Pb must be carefully chosen to make them comparable. Wide discrepancies between different laboratory methods point up the need for comparability studies. (Author summary modified)

38676

APTIC NO. 61458

Steenken, Folkhard

FUMIGATION OF CULTIVATED PLANTS WITH LEAD-CONTAINING AND LEAD-FREE AUTOMOBILE EXHAUST GASES. (Begasung von Nutzpflanzen mit bleihaltigen und bleifreien Autoabgasen). Text in German. Z. Pflanzenkrankh. Pflanzenschutz, 80(9/10):513-527, 1973, 40 refs.

The direct fumigations of cultivated plants in greenhouses with automobile exhaust gas caused widespread intercostal partly lethal destruction especially of older leaves. Young leaves were only slightly injured. Between those plants fumigated with lead-containing motor emissions and those fumigated with motor emissions free of lead no distinguishable lesions appeared. These plants did not show the lead-injury symptoms known from the fumigation experiments. The chief injuring components are gaseous, primary and secondary reaction products of the automobile exhausts. The plants treated with automobile exhausts free of lead were more severely injured at most of the exposures than those fumigated with lead-containing exhausts. The fresh and dry weight, each determined 3 weeks after the last exposure, and the weight of the fruits, however, were relatively balanced in both test series. Although the test plants contained up to 350 mg lead/kg dry matter, these concentrations did not lead to any statistically demonstrable depressions of yield or growth. In the adaptation experiments the plants grown up in relatively low amounts of atmospheric pollution first showed a highly significant decrease of growth compared with the control plants. However, after growing further in exhaust-free air the injured plants reached the same stage of development after 28 days. The adaptability was verified by the end fumigations executed with high concentrations. It proved that the longest adapted plants had acquired the greatest resistance against the automobile exhausts. An adaptation effect could only be obtained by longer lasting continuous action. Short-term fumigations remained unsuccessful.

38677

APTIC NO. 61304

Taniyama, T. and K. Sawanaka

ON THE GROWTH OF LOWLAND RICE PLANT IN YOKKAICHI. (Yokkaichi ni okeru suite no seiku ni tsuite). Text in Japanese. Nissaku Tokai Shibu Kenkyu Kogai(Outline Stud. Tokai Branch Jap. Soc. Agric. Crops), no. 66:25-28, 1973, 1 ref.

Growth experiments were carried out on potted lowland rice plants placed near air pollution monitoring points in air polluted areas of Yokkaichi City and in relatively unpolluted areas of Tsu City. The soil conditions, fertilization, sunshine, temperature, and initial size and variety of the seedlings were identical. The period of growth was June 1 to September 29.

Sulfur dioxide concentration was high in two places (30-50 ppb). There were no large differences in growth of the plants between polluted and unpolluted areas. No brown or white lesions (the specific symptom of SO₂ damage) appeared even in the polluted area, but there was a difference in tillering number (it was smaller in the polluted areas). Furthermore, the leaf area and the weight of leaves, stalks, and roots was smaller in Yokkaichi than in Tsu. The number of ears and delays in time of earing showed the same tendency.

38678

APTIC NO. 61402

Taniyama, T. and K. Sawanaka

ON THE HARVEST OF PADDY IN AIR POLLUTED AREA (YOKKAICHI). (Taiki osen chiiki (Yokkaichi) ni okeru suito no shuryo ni tsuite). Text in Japanese. Nissaku Tokai Shibu Kenkyu Kogai (Outline Stud. Tokai Branch Jap. Soc. Agric. Crops), no. 67:41-46, 1973. 5 refs.

In terms of leaf damage, rice plants are less susceptible than rape, wheat, clover, and tobacco to the effects of air pollutants. The effects on dark photosynthesis and respiration, however, appear earlier on rice than on other plants. Experimental results were recorded for potted rice plants kept outdoors in polluted and unpolluted areas comparing the harvested number of ears, number of fertilized grains per ear, maturity, and weight of unpolished grains. All the parameters were negatively correlated to the concentration of sulfur dioxide. The number of ears per stump was smaller in 15-28% of the plants. The rate of maturity was smaller. The weight of 1000 grains was lighter. The total harvest was smaller in 6-9% of the cases. In special cases it was 35% lower than the harvests in unpolluted areas.

38679

APTIC NO. 61413

Taniyama, Tetsuro and Kazuo Sawanaka

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. XI. EFFECT OF SULFUR DIOXIDE TREATMENT FOR LONG PERIOD ON GRAIN PRODUCTION IN RICE PLANTS. (Sakumotsu no gasu shogai ni kansuru kenkyu. Dailipo: Aryusan gasu no chojikan sesshoku ga suito no shijitsu seisan ni oyobosu eikyo). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 42(2):143-147, June 1973. 11 refs.

The effect of fumigation with sulfur dioxide for a long time on grain production in rice plants was investigated to determine constitutional components, the percentage of germination, and the sulfur content of the kernels and leaves were measured. When rice plants were fumigated for 10 days with SO₂ in the reduction division stage, the number of spikelets per panicle and weight of 1000 kernels were decreased with increased concentrations. There were significant effects at concentrations of 0.5 and 5 ppm SO₂ on the percentage of ripened grains. When the plants were fumigated for 10 days in the flowering stage, the percentage of ripened grains decreased as the concentration of SO₂ increased. The only component affected was the number of panicles per plant, which decreased slightly. In most plots, the percentage of germination of seed from plants fumigated by SO₂ was not affected by treatment. Plants fumigated in the flowering stage by 5 ppm SO₂ had a 92% reduction in germination and the seminal root of seedlings was somewhat translucent. The sulfur accumulation in leaves increased in proportion to SO₂ concentrations, although kernels were not influenced by treatment.

38680

APTIC NO. 61479

Taniyama, T. and K. Sawanaka

ON THE INDEX PLANTS OF AIR POLLUTION IN YOKKAICHI. (Yokkaichi ni okeru taiki osen no shihyo shokututsu ni tsuite). Text in Japanese. Nissaku Tokai Shibu Kenkyu Kogai (Outline Stud. Tokai Branch Jap. Soc. Agric. Crops), no. 67:47-49, 1973. 1 ref.

Plant damage can be used as an index of air pollution. In order to select the most useful for such indices (in terms of susceptibility, reproducibility, and ease of cultivation) damage to 28 species of annual and perennial herbs and trees from sulfur dioxide concentration from 30-70 ppb was examined. The following herbs and trees (with their corresponding damages) are recommended: Ginkgo biloba (reddish brown discoloration of leaf periphery, or general browning of whole leaf), Corylopsis pauciflora (withering of completely developed leaves from their periphery), Metasequoia glyptostroboides (reddish browning of apex of leaves), Osmanthus asiaticus (grayish-white damage of leaves and growth disturbance), cultivated Iris species (severe browning from apex to central part of leaves), Hosta species (grayish-brown and grayish-white discoloration of leaf periphery), Gladiolus gandavensis (brown or reddish-brown lesions on the apex and between veins of leaves), and cultivated Paeonia species (peripheral grayish-brown discoloration and sometimes grayish-brown spots on leaves).

38681

APTIC NO. 61589

Tatekawa, Hiroshi, Tadanori Kanno, Sakae Saito, and Hideo Tachiya

FORECASTING OF CADMIUM IN RICE PLANT BY AIR POLLUTION. (Suito ni taisuru taikigata osen no kadamiumu osen yosokuho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):315, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 63.)

Air pollution by cadmium, zinc, lead and copper dusts from the Aizu Refinery was investigated by measuring air quality and by checking the cadmium content in the rice plant in relation to the time of absorption of Cd from the air. The air was measured at 13 locations involving various directions and distances; samples were taken by dust jar at the end of every month and analyzed by spectrophotometry. The rice experiment was conducted at an agricultural test station. During the rice culture period of 4 mo, the northwestern and eastern sampling locations at a distance of 1.5 km each had heavy settling particles, ranging between 5 and 9 kg/sq km. The ratios of heavy metals in the settling particles were, to the west of the plant, Cd, 1; Cu, 2.1; Z, 125; and lead, 15.5. To the east, the ratios were Cd, 1; Cu, 2.1; Z, 130; and Pb, 12.1. There was a close correlation between the amount of settling Cd and Cd content in unpolished rice. The amount of Cd absorption in the rice was approximately 20% between planting of seedling and the first ear formation; 8% during the early stage of ear formation; and 72% during the ripening stage. Pollution from the refinery should be particularly controlled during the 45 days of maturity of rice plants.

38682

APTIC NO. 61501

Terakado, K.

INVESTIGATION AND STUDIES ON PLANT DAMAGE DUE TO TOKYO PHOTOCHEMICAL SMOG. PART II: ON THE DAMAGE OF PETUNIA WHICH SHOWED THE SYMPTOMS LIKE INJURIES BY PAN (PEROXYACETYL NITRATE). (Tokyo kokagaku sumoggu no shokubutsu higai ni kansuru chosa kenkyu. 2. PAN (Pakishashiru naitoreto) shoyo ni nita Pechunia no higai ni tsuite). Text in Japanese. Tokyo-to Nogyo Shikenjo Kenkyu Nenpo (Annu. Rep. Tokyo Met. Agr. Exp. Sta.), 1972:2-3, Oct. 1973.

Twice in the middle of June and in early Aug. 1972, petunia leaves were damaged by peroxyacetyl nitrate in Tokyo. The leaf damage, root activity, and pH and specific conductivity of the soil were studied. Similar plants were exposed experimentally to ozone for comparison. No damage was found on other types of plants in the same greenhouse, and different types of petunias were damaged to different degrees. The damage was studied by microscopy and by gross symptoms.

38683

APTIC NO. 60451

Tolan, A. and G. A. H. Elton

LEAD INTAKE FROM FOOD. Commission of the European Communities, Luxembourg, and Environmental Protection Agency, Washington, D. C., Proc., Int. Symp., Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 77-84, May 1973. 10 refs. (Oct. 2-6.)

The food components of the English national diet were monitored for lead. Analyses of food samples representative of the average diet indicated a mean Pb concentration in the diet of 0.13 mg/kg, from which it was estimated that the daily intake of the average person in the United Kingdom amounts to about 200 micrograms of Pb. There was no food or food category which was a major source of Pb. More Pb was present in canned food than in the corresponding fresh food, although this was of minor significance in the diet except possibly for babies consuming relatively large amounts of canned baby foods. Some of the Pb in the food may have come from industrial Pb deposition, Pb fallout from vehicle emissions, Pb in sewage sludge used on agricultural land, and Pb discharges into the water. (Author summary modified)

38684

APTIC NO. 61152

Yoneyama, T. and N. Date

INVESTIGATION AND STUDIES ON PLANT DAMAGE DUE TO TOKYO PHOTOCHEMICAL SMOG PART III: STUDIES ON THE DAMAGE OF HORTICULTURAL PLANTS AS INDEX OF OXIDANT. (Tokyo kokagaku sumoggu no shokubutsu higai ni kansuru chosa kenkyu; 3. engei shokubutsu no taiki osen-gai ni kansuru kenkyu (3) engei shokubutsu no okishidanto shihyosei ni kansuru chosa). Text in Japanese. Tokyo-To Nogyo Shikenjo Kenkyu Nenpo (Annu. Rep. Tokyo Met. Agr. Exp. Sta.), 1972:4, Oct. 1973.

The degree of damages of several varieties of maize and big-marigold due to oxidant was investigated. The findings were (1) golden-cross-bantam variety of maize (early) was very susceptible to oxidant showing clear symptoms such as oily-infiltration, chlorosis and necrosis in spots, while white glutinous variety (late) was less susceptible, and (2) big-marigold in inflorescent stage was very sensitive to oxidant, more so in red-flower strain than yellow-flower strain, showing small spots slightly discolored on the upper surface of the leaves.

38685

APTIC NO. 61166

Yoneyama, T. and N. Date

INVESTIGATION AND STUDIES ON PLANT DAMAGE DUE TO TOKYO PHOTOCHEMICAL SMOG PART III: STUDIES ON THE DAMAGE OF HORTICULTURAL PLANTS, (2) EXPERIMENTS ON THE EFFECTS OF SOIL CONDITION TO THE DAMAGE OF SOFT VEGETABLES CAUSED BY OXIDANT. (Tokyo kokagaku sumoggu no shokubutsu higai ni kansuru chosa kenkyu; 3. engei shokubutsu no taiki osen-gai ni kansuru kenkyu (2) dojo joken ga nanjaku yasai no okishidanto higai ni oyobosu eikyo ni kansuru shiken). Text in Japanese. Tokyo-to Nogyo Shikenjo Kenkyu Nenpo Annu. Rep. Tokyo Met. Agr. Exp. Sta., 1972:3-4, Oct. 1973.

An experiment was carried out on potted spinach and salting greens planted in soils (alluvial loam) with different pH, exchangeable cation, and with different types and rate of nitrogen and potassium (slow release fertilizer and quick release fertilizer with different rates) especially for salting greens. These vegetables were exposed to natural oxidant. The conditions found to protect the vegetables from the attack of oxidant were: pH of neutral to slight alkaline, exchangeable cation in the normal range from 0.3 through 1.0, existence of nitrogen in nitric state and in appropriate concentration, and existence of enough amount of available potassium. The existence of nitrogen in ammoniacal state strongly aggravated the oxidant damage.

200

38686

APTIC NO. 61502

Yoneyama, T. and N. Date

INVESTIGATION AND STUDIES ON PLANT DAMAGE DUE TO TOKYO PHOTOCHEMICAL SMOG. PART III: STUDIES ON THE DAMAGE OF HORTICULTURAL PLANTS, (1) VISIBLE DAMAGE OF SOFT VEGETABLES AND THE CONCENTRATION OF OXIDANT. (Tokyo kokagaku sumoggu no shokubutsu higai ni kansuru chosa kenkyu. 3. Nengei shokubutsu no taiki osen-gai ni kansuru kenkyu, (1) nanjaku yasai no kashi-gai to kishidanto nodo ni kansuru chosa). Text in Japanese. Tokyo-to Nogyo Shikenjo Kenkyu Nenpo (Annu. Rep. Tokyo Met. Agr. Exp. Sta.), 1972:3, Oct. 1973.

The visible damage on spinach appeared at first as oily infiltration spots on the upper side of the leaves which were then discolored with loss of moisture; the spots were bleached depressions. The spots of welsh onions appeared as bleached spots at 5-15 cm from the apex of the leaves; the leaves showed the symptom-like tip-blight after 48 hr of exposure to oxidant.

38687

APTIC NO. 60907

Young, Michael John

THE EFFECTS OF GASEOUS FLUORIDE ON DELICIOUS AND GOLDEN DELICIOUS APPLES. Washington State Univ., Pullman, Dept. of Horticulture, Thesis (Ph.D.), Ann Arbor, Univ. Microfilms, Inc., order no. 73-29,311, 1973, 82p. 46 refs.

Atmospheric fluorides were monitored in apple and other fruit orchards around two adjacent sources of fluoride emissions in the Wenatchee, Washington fruit growing area, and Delicious and Golden Delicious trees were fumigated with low (4.6-4.7 micrograms F/cu m) and high (7.8-9.0 micrograms F/cu m) fluoride levels once, twice, or three times a week. The effects of fluorides on fruit trees were then determined. Exposure of lined filter papers was a more sensitive method of detecting ambient fluorides than analysis of apple tree foliage. However, both methods were adequate in the determination of the fluoride distribution pattern in the study area. Considerably higher levels of fluoride were detected at sampling sites downwind of the emission sources. Fluoride-induced tip necrosis on apple leaves was observed in one orchard where a mean seasonal lined filter paper value of 82.4 micrograms F/d sq m/mo and 22.5 F in the washed foliage were recorded. Tip necrosis increased as the F level and frequency of exposure increased. Leaf respiration was inhibited at the lower but not the higher F fumigation level. Fruit respiration was stimulated to equal levels by the two F concentrations used. A trend toward increased inhibition of fruit ethylene production at lower exposure factors (concentration times time) was observed. The loss of green color in the skin of treated fruits was retarded relative to an increase in the F level and the exposure frequency. With the exception of leaf respiration, where an inverse relationship was found, the degree of response with respect to leaf injury, fruit respiration, and color were directly affected by the exposure factor used. Within the scope of this study, fruit shape, firmness, and soluble solids were not affected by the treatments. (Author abstract modified)

38688

APTIC NO. 61558

Kanagawa Prefecture Office (Japan), Secretariat of Countermeasures to Environmental Pollution

STUDIES ON THE LOCAL EVALUATION OF THE EFFECTS OF AIR POLLUTION BY BIOLOGICAL INDEX, INTERIM REPORT I. ON THE EVALUATION OF AIR POLLUTION BY REMOTE SENSING. (Seibutsu shihyo ni yoru taiki osen eikyo no chiki hyoka ni kansuru chosa kenkyu - chukan dai 1 po). Text in Japanese. 10p., Dec. 1973.

The amount of arboreal activity locally affected by air pollution and numerical data obtained by transformation of aerial

photography of local arboreal activity were compared to determine a biological air pollution index. The remote sensing technique used in Japan is described. The investigation was carried out in Sept. 1973 and Oct. 1972 in 16 districts of Kanagawa Prefecture on three evergreen trees and three deciduous trees easily affected by air pollution. A noticeable correlation occurred between arboreal activity of zelkova, ginkgo, castanopsis, and mixed flora and the photographic density and their ratios.

1972

38689

APTIC NO. 60740

Kerin, Danimir

FUME DAMAGE TO FORESTS BY THE LEAD AND STEEL INDUSTRY IN THE FORE-ALPS REGION OF YUGOSLAVIA. (Waldrachschaden der Blei- und Stahlindustrie im Voralpengebiet Jugoslawiens). Mitt. Forst. Bundesvers., vol. 97:129-139, 1972. 10 refs. (Presented at the Congress of the International Union of Forest Research Organizations, 15th, Gainesville, Fla., March 14-21, 1971.) Translated from German, 8p.

The fume pollution from the Mezica lead works and the Ravne iron works has caused forest damage in the Fore-Alps region, not far from the Austrian border in Carinthia. The pollution affects a total area of over 2000 hectares. The roasting of sulfidic lead ores releases over 10 tons of sulfur dioxide and aerosols containing lead and lead oxide into the air every day. There are large accumulations of Pb and sulfur in the soil. Over 90% of the pine and silver fir needles investigated exhibited a high S content. Values of up to 0.33% sulfate (86% dry matter) are considered normal from an unpolluted area. The SO₄ content of the needle samples from the polluted region was 0.61-1.0% SO₄ in 10% of the samples, it was over 1% SO₄. The iron content of needle samples from unpolluted areas averages 123 ppm. Over 80% of the samples in the polluted area of the Ravne ironworks contained 200-1200 ppm Fe; most of the samples were in the range 200-700 ppm. The ironworks also emitted SO₂ and manganese. The Pb content of the needle samples from an unpolluted area is 3-6 ppm; from the Mezica Pb works area it was 30-500 ppm Pb, most of the samples were in the range 50-200 ppm. Air sulfur dioxide concentrations were 0.1-0.2 ppm on the average, with short-term peaks of 0.5-1.5 ppm. The average value of the turbidity test from an unpolluted area is 29, while 60% of the needle samples from the polluted area gave turbidity test values of over 75 (severe damage), and 30% of the samples gave 56-75 (medium damage). The chemical values agreed with the visible signs of damage in the conifer forest regions. Sulfur dioxide in the air and zinc in leaves were also measured near a Zn plant.

38690

APTIC NO. 60690

Leblanc, Fabius, Dhruva N. Rao, and Gilberte Comeau

INDICES OF ATMOSPHERIC PURITY AND FLUORIDE POLLUTION PATTERN IN ARVIDA, QUEBEC. Can. J. Botany, 50(5):991-998, 1972. 11 refs.

Indices of atmospheric purity (IAP) of 42 sites located in all directions from the aluminum factory at Arvida and spread out in about 250 sq km area, were determined on the basis of phytosociology of epiphytes of *Populus balsamifera*. These index values ranging from 0 to 103 were arranged into six groups and the investigated area was accordingly delineated into six IAP zones to represent areas with different levels of fluoride pollution. A relative picture of the approximate limits of F contamination in different zones is obtained by the F accumulation in *Parmelia sulcata* thalli transplanted at various sites in the area. (Author abstract)

38691

APTIC NO. 61404

Taniyama, T. and K. Sawanaka

DAMAGE OF CROPS BY ENVIRONMENTAL AIR POLLUTION IN YOKKAICHI AREA. (Yokkaichi chiiki no okeru nosakumotsu kogai no genkyo). Text in Japanese. Nissaku Tokai Shibu Kenkyu Kogai (Outline Stud. Tokai Branch Jap. Soc. Agric. Crops), no. 63:29-31, 1972.

Crop damage from sulfur dioxide was evaluated in the Yokkaichi area in 1971 by measuring dry matter and seed production. The average concentration of SO₂ per hour was 0.034 ppm from April to November 1971. There were, however, some cases of monthly hourly averages greater than 0.4 ppm. In these situations damages to major crops was largely due to sulfurous and sulfuric acid mists. The damages to major crops included brown and red spots, apical and peripheral chlorosis, yellowing of leaves, belt-like yellowing of sheath, white or black discoloration of rice plants, nonfertilization of rice plants, apical blight and chlorosis of Welsh onion, partial yellowing and general withering of pine trees in summer (and some death), watering and chlorosis of leaves of brassica species, and yellowing and spot formation on Japanese radishes. Also noted was a decrease in tiller number of rice plants (17.4 in polluted vs. 19.4 in unpolluted areas). Some cases were found in which the sulfur content of SO₂-damaged crops was higher than that of undamaged crops.

38692

APTIC NO. 61412

Taniyama, Tetsuro, Hiroki Arikado, Yukihiko Iwata, and Kazuo Sawanaka

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. X. ON PHOTOSYNTHESIS AND DARK RESPIRATION OF THE RICE PLANT FUMIGATED WITH SULFUR DIOXIDE FOR LONG PERIOD. (Sakumotsu no gasu shogai ni kansuru kenkyu: Dailoppo: Arysuan gasu ni chokikan sesshoku shita suite no kogosei ankoku ni tsuite). Text in Japanese. Nippon Sukumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 41(2):120-125, June 1972. 5 refs.

The aftereffects of sulfur dioxide treatment for long periods on photosynthesis and dark respiration in the rice plant were investigated 24 hr after treatment. The plants were exposed for 90 hr in the tillering stage to concentrations of 0, 0.271, 0.719, and 1.415 ppm and for 66 hr in the maximum tillers stage at concentrations of 0, 1.2, 4.0, and 10 ppm. There was a considerable decrease in photosynthesis 24 hr after the plant had been released from fumigation with the gas at both the tillering and maximum number of tiller stages at any concentration of the gas. Gross photosynthesis of the rice plant was gradually decreased with an increase in the concentration of the gas and the difference between the control and treated plants in apparent and gross photosynthesis was enlarged with an increase in the light intensity. The light compensation point of the rice plant moved towards a higher light intensity in accordance with the concentration of the gas. In a single leaf, the light curve of carbon assimilation in the rice plant treated with SO₂ for 80 hr always showed lower values than that of the control 1, 3, and 6 days after SO₂ was removed. Apparent photosynthesis decreased proportionally to increases in the SO₂ concentration.

38693

APTIC NO. 60739

California Air Resources Board, Los Angeles, California Dept. of Public Health, Berkeley, California Dept. of Agriculture, Sacramento, and the San Francisco Bay Area Air Pollution Control District

A JOINT STUDY OF LEAD CONTAMINATION RELATIVE TO HORSE DEATHS IN SOUTHERN SOLANO COUNTY. 179p., Sept. 1972. 28 refs.

The cause of death of a number of horses in the Benicia area from 1968 to 1970 was studied. The diagnosis in all cases was

chronic lead poisoning, possibly aggravated by other factors. Pasture grass was the major source of nutrition of the affected animals. The major source of lead in the area was the 600-foot stack at the lead smelter at Selby, California. Other sources of lead were automotive exhaust, bridge maintenance activities and various industrial sites. The 1970 ambient air concentrations of particulate lead were typical to those found in urban and suburban areas, and were not high enough to cause the horse deaths by inhalation. However, lead flux, which is the amount of airborne lead passing through a given area in a specific time interval, was considerably higher in the study area than in other locations in the San Francisco Bay Area, where such high wind speeds do not usually occur. The high vegetation lead levels may have been due to the high wind velocities and the filtering action of the plants. (Author summary)

1971

38694

APTIC NO. 60957

Keller, Theodor

AIR POLLUTION EFFECTS ON VEGETATION. (Auswirkungen der Luftverunreinigungen auf die Vegetation). Text in German. *Städtehygiene* (Uelzen/Hamburg), 22(6):130-136, June 1971. 16 refs

The dust filtering effect of vegetation, and the effects of air pollutants, especially gaseous ones, on vegetation in general, and on forests in particular, are reviewed. Vegetation, and especially forests, have enormous dust filtering capacity whereby they are able to considerably reduce the atmospheric dust concentrations without suffering damage themselves, provided the dusts filtered out are inert. While most dusts are harmless for vegetation, gaseous pollutants, especially sulfur dioxide and fluorine, cause serious damages in forests by interfering with cellular metabolism and assimilation, and causing chlorosis, necrosis, or even death. Assimilation and forest production can be seriously damaged even when there are no visible signs of injury. For such reasons, the maximum allowable SO₂ concentration should be substantially lowered from the present level of 0.2 ppm. The resistance of plants to SO₂ greatly varies depending on species, season, period of vegetation, and daytime. Specimens of the same species are usually less sensitive during night and in winter, and so are the youngest and oldest leaves of plants. Automotive emissions, partly responsible for smog formation, represent a potential source of forest damage in Switzerland. Apart from the development of high-efficiency emission control equipment, fuel and flue gas desulfurization, as well as technological improvements in industries with the aim of emission abatement, vegetation damages due to air pollution can be reduced considerably by the selection of resistant species and fertilization.

38695

APTIC NO. 60579

Kirschbaum, A. and R. Klee

LICHEN EXPLANTS AND NATURAL OCCURRENCE OF LICHENS. (Flechtenexplantate und natürliche Flechtenvorkommen). Text in German. Regionale Planungsgemeinschaft Untermain Frankfurt am Main (West Germany), *Lufthyg.-Meteorol. Modelluntersuch.* Reg. Untermain, 4th, Frankfurt am Main, West Germany, 1971, p. 64-66. (Nov. 4-5.)

Lichenologic studies with lichen explants and with naturally occurring lichens, being conducted in the Lower Main region in West Germany within the framework of an air hygienic and meteorologic model study of that region, are described. *Parmelia physodes* explants from oak trees growing in nonpolluted areas were exposed in polluted areas, such as in an industrial area, an airport, a petroleum refinery, and near a large chemical plant. The degree of air pollution in the exposure site was evaluated by the degree of the lichen damage in seven grades. The large-scale average distribution of air pollution in the survey area was studied by surveying the natural occur-

rence of lichen species on 10 apple trees in area units of 6.25 sq km each. The lichen explant and lichen survey methods compared by the study of naturally occurring lichens in the nearby of the exposure site of lichen explants.

38696

APTIC NO. 60580

Munzel, E.

FORESTRY PRACTICE AND AIR HYGIENIC, METEOROLOGIC MODEL STUDIES. (Forstliche Praxis und lufthygienisch-meteorologische Modelluntersuchung). Text in German. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), *Lufthyg.-Meteorol. Modelluntersuch.* Reg. Untermain, 4th, Frankfurt am Main, West Germany, 1971, p. 66-71. (Nov. 4-5.)

The wooded areas in the Lower Main region in West Germany have been surveyed according to their various environmental functions within the framework of an air hygienic and meteorologic model study of that area. The basic functions of wooded areas are, apart from wood production, the protection of roads and highways from falling rocks and landslides, protection against soil erosion, protection against air filtration due to their filtering effect, the improvement of the local climate, and the hiding of eyesores. Forest damages near industrial areas, once local, have become increasingly regional.

38697

APTIC NO. 61411

Taniyama, Tetsuro, Hiroki Arikado, and Yukihiro Iwata

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. IX. EFFECT OF SULFUR DIOXIDE TREATMENT FOR LONG PERIOD ON DRY MATTER PRODUCTION IN RICE PLANTS. (Sakumotsu no gasu shogai ni kansuru kenkyu: Dai9ho: Aryusan gasu (SO₂) no chokikan sesshoku ga suite no kanbutsu seisan ni oyobosu eikyo). Text in Japanese. *Nippon Sakumotsu Gakkai Kiji* (Proc. Crop Sci. Soc. Japan), 40(4):455-461, Dec. 1971. 13 refs.

The effect of sulfur dioxide treatment over a long period on dry matter production in rice plants was investigated. The number of tillers in rice plants was decreased with an increase in the concentration of SO₂, but the results of the investigation on the effect of SO₂ on the plant height and leaf age in rice plants by SO₂ did not show any significant differences. Total dry weight (leaves, stems, and roots) of rice plants gradually decreased with an increase in the concentration of SO₂ and an extension of treatment hours. A typical injury by SO₂ was not discovered on the leaf blade and sheath either during or after treatment. New assimilation rates and increase rates of dry matter in the rice plants were markedly decreased by SO₂ treatment for long periods.

1970

38698

APTIC NO. 60707

Devos, A.

INFECTION AND CONTAMINATION IN HATCHING AND BREEDING ROOMS. (La contamination atmosphérique et la désinfection dans les couvoirs et les élevages). Text in French. Preprint, p. 40.1-40.13, 1970. 34 refs. (Presented at the Rijksuniversiteit-Gent Journées d'Etudes Internationales, Gent, Belgium, Nov. 9, 1970.)

The effect of disinfectants on microbial air pollution in hatcheries and breeding rooms was studied. Since microbial air pollution in hatching compartments was found to be highest during the 3 hr of hatching and during the drying of the chicks, egg disinfection before incubation with Halamid 0.3%, and D 39 0.4% (Environ; phenol derivative with anionic detergent) strongly reduced the number of microorganisms cultured on gelose-tryptone, McConkey and Sabouraud substrates, and on Mannite Salt Agar. In breeding compartments, repeated spraying with D 39 proved to be most efficient.

38699

APTIC NO. 60969

Dobrovolsky, I. A. and E. A. Strikha

STUDY OF THE PHYTOTOXICITY OF SOME COMPONENTS OF INDUSTRIAL AIR POLLUTION. (Vivchennya fitotoksichnosti deyakikh komponentiv promislavogo zabrudnennya povitrya). Text in Ukrainian. Ukr. Bot. Zh., 27(5):640-644, 1970. 13 refs.

The effect of 0.01, 0.03, 0.05, 0.1, 0.3, and 1.0 mg/cu m concentrations of hydrogen sulfide, and of 0.1, 0.5, 1.0, 3.0, and 5.0 mg/cu m concentrations of sulfur dioxide on germination of radish seeds, and on the initial growth of the seedlings organs, was studied. Retardation of both the germination, and the growth and development of the seedling organs, as well as reductions in the rates of chlorophyll and organic substance synthesis, and decrease in the catalase activity due to both H₂S and SO₂ were observed. Hydrogen sulfide proved to be much more phytotoxic than SO₂. Total damage of the leaves due to 5 mg/cu m concentration of SO₂ was observed. The previous treatment of the radish seeds with 0.5 solution of manganese sulfate noticeably increased the resistance of the plants against both H₂S and SO₂.

38700

APTIC NO. 60595

Garrec, J.-P. and A. Fourcy

RAPID ANALYSIS OF FLUORINE DEPOSITS ON VEGETATION GROWING IN POLLUTED AREAS BY RADIOACTIVATION WITH 14MEV NEUTRONS. (Analyse rapide par radioactivation sous neutrons de 14 MeV des depots de fluor sur la vegetation en zone polluee). Text in French. 3rd European Fluorine Chemistry Symposium, Aix-en-Provence, France, 8p., July 1970. 11 refs.

A method for the quantitative analysis of fluorine deposits on plants by neutron activation at 14 MeV is described. The plant samples to be analyzed are dried at 70 C, crushed, and introduced into a polyethylene container for irradiation for a present duration at 14 MeV for 1 min and subsequent counting for 30 sec, the neutron yield being 30,000,000,000 neutrons/sec/4 pi. The quantity of the irradiated fluorine is determined from the net surface of the total absorption peak at 200 keV against a previously irradiated fluorine samples used as a reference. Comparative chemical and neutron activation analyses of apple-tree leaves from a fluorine-exposed area showed good agreement between the results of the chemical and neutron activation analyses. The neutron activation analysis has the advantage of being rapid, since one complete analytical procedure takes about 5 min. However, it is not suitable for the determination of small quantities of fluorine.

38701

APTIC NO. 61410

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. VIII. SYMPTOMS OF INJURY AND STOMATAL APERTURES OF TULIP PLANT EXPOSED TO SULFUR DIOXIDE AND HYDROGEN FLUORIDE. (Sakumotsu no gasu shogai no kansuru kenkyu: Dai8ho: Fukkasuiso oyobi arysuan gaku ga churippu ni oyobosu shogai no jit-tai narabi ni kiko kaido ni oyobosu eikyo). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 39(4): 525-532, Dec. 1970. 13 refs.

The injurious effects of sulfur dioxide and hydrogen fluoride in the atmosphere on stomatal apertures of tulip plants of the flowering stage were investigated. Injuries by 100 ppm SO₂ and HF were observed on leaf, floral axis, and petal of the plant, especially whole leaves, which were severely damaged. Injuries at concentrations of 30 ppm and below were observed only on the leaf. The leaf was changed in color from green to white by SO₂ and from green to greyish brown by HF. There was a significant difference in susceptibility between the injury by SO₂ and HF; the leaf was more sensitive to SO₂. From

the result of estimation of stomatal number in the position and the portion of leaf, it is suggested that higher susceptibility of the leaf than that of the floral axis was due to the greater number of stomata per unit area of the leaf. The injury symptom in a leaf developed gradually from the tip to the central and base portions.

38702

APTIC NO. 61416

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. VI. EFFECTS OF SULFUR DIOXIDE ON THE PHOTOSYNTHESIS OF RAPE AND BARLEY. (Sakumotsu no gasu shogai ni kansuru kenkyu. Dai6po: Hadakamugi oyobi natane no kogosei ni oyobosu SO₂ gasu no eikyo). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 39(1):111-116, March 1970. 6 refs.

The relationship between photosynthetic rate, air temperature, concentrations of sulfur dioxide and treatment time for which rape and barley were exposed to sulfur dioxide gas was investigated. The photosynthetic rate of rape and barley was markedly decreased by an increase in the concentration of SO₂ and extension of exposure time, in the plots treated by 5 and 10 ppm SO₂, respiration exceeded photosynthesis. The rate of apparent photosynthesis was decreased by about 160% 8 hr after barley was exposed to 10 ppm SO₂, and about 140% 7 hr after rape was exposed to 5 ppm SO₂, compared with the control. In making a comparison between the rate of decrease of the apparent photosynthesis to 0 ppm SO₂ of rape and barley at 20 C, there were frequent occasions when barley was higher than rape. The rate and degree of the effect on photosynthesis of 0 ppm SO₂ (control) was generally higher values at 20 C than 10 C in both plants. An injurious effect of SO₂ on the apparent photosynthesis of rape and barley varied with difference of air temperature during treatment with SO₂, the concentrations of SO₂, and treatment time for which both plants were exposed to the gas.

38703

APTIC NO. 61420

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. VII. EFFECTS OF SULFUR DIOXIDE ON RESPIRATION OF RAPE PLANTS. (Sakumotsu no gasu shogai ni kansuru kenkyu: Dai7ho: Natane no kokyuu sayo ni oyobosu SO₂ no eikyo). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 39(2):221-225, June 1970. 6 refs.

The effect of sulfur dioxide on the respiration rate at the flowering stage of rape plants was investigated at 10 C, 20 C, and 30 C. The respiration rate was accelerated by exposing the plants to SO₂ at concentrations of 5, 10, 15, and 20 ppm at 30 C. At 20 C, the respiration rate was generally suppressed for 5 hr after exposing the plants to SO₂, excepting SO₂-20 ppm. At 10 C, it was depressed by fumigation with SO₂. The respiration rate increased linearly with increasing concentration of SO₂ at 30 C. At 20 C it was suppressed for 0-4 hr after exposing the plants to SO₂, but for 5-8 hr, it was accelerated by treatment of SO₂ at concentrations of 5 and 10 ppm. At 10 C, respiration was always retarded by SO₂. The respiration rate at the flowering stage of rape plants is affected by the concentration of SO₂, the number of hours of exposure, and different air temperature.

1969

38704

APTIC NO. 60517

Jonas, Herbert

ACTION OF AIR POLLUTANTS ON THE BIOSYNTHESIS OF SECONDARY PLANT PRODUCTS. Econ. Bot., 69(3):210-214, 1969. 30 refs.

203

The effects of ozone, its reaction products with nitrogen dioxide and olefins, and sulfur dioxide on the biosynthesis of secondary plant products which are pharmaceutically valuable are reviewed. Ozone damage to plants such as tobacco can be higher in exposure to light. Several protective measures for plants are available, such as using ascorbate and spraying sugar on leaves. The effects of pollutants which form during photochemical smog initiated by automobile exhausts on plants are described. Nitrogen dioxide injures plants in proportion to the opening of the stomata; peroxyacetyl nitrate (PAN) attacks the spongy leaf parenchyma and inhibits the Avena coleoptile test for indole-3-acetic acid. Photosynthesis is depressed by PAN. Respiratory reactions can be inhibited by PAN and smog. The inhibition of the principal electron transfer systems within and outside of the dicarboxylic acid cycle will retard the rate of biosynthesis of secondary products.

38705

APTIC NO. 60736

Krutikow, A.

CHANGES IN THE BIOGENOSIS OF FORESTS IN THE CRACOW INDUSTRIAL AREA. (Zmiany w biocenozie lasow krakowskiego okregu przemyslowego). Text in Polish. Las Polski, no. 13/14: 23-24, 1969.

Changes in the biocenosis of forests in the Cracow industrial area resulting from air pollution due to numerous steelworks, steam-driven electric power stations, paper mills, a cellulose factory, and other industrial plants are documented. The dust deposited on tree crowns contained particles of iron, lead, copper, zinc, and sulfides. The long-time action of gases, dust, and smoke did not increase acidity of the soil but rather decreased acidity of the upper layer. The first evidence of air pollution was the disappearance of mosses on the bark and branches of trees. Pine trees ceased to produce cones and were the most sensitive to air pollution. The changes in pines, beeches, and forest undergrowth are described. These changes altered the population of insects, birds, and mammals living in these forests. Some types of pests affecting pine trees have considerably multiplied; however, foliage of deciduous trees was almost free of damages due to insects. Some type of insects (aphids, etc.) have almost disappeared. The number of ant hills has decreased. Some species of birds (titmouse, flycatcher, kinglets) have decreased although the number of starlings has increased. Squirrels have almost entirely disappeared. The condition of trees has recently improved and needles of pines have the normal color and length. A change in the direction of prevailing winds, increased precipitation, or a possible decrease in atmospheric dust released by industrial plants may account for the improvement.

38706

APTIC NO. 61414

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. V. EFFECTS OF SULFUR DIOXIDE ON PHOTOSYNTHESIS OF RICE PLANTS. (Sakumotsu no gasu shogai ni kansuru kenkyu. Dai5ho: Suito no tansan doka sayo ni oyobosu SO₂ gasu no eikyo). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 38(4):598-602, Dec. 1969. 10 refs.

The injurious effect of sulfur dioxide on photosynthesis and absorption of sulfur into leaves of the rice plant was examined. Both apparent and gross photosynthesis were depressed by fumigation with SO₂. Apparent photosynthesis was completely restrained 1 hr after the plant was exposed to the gas, when treated continuously at concentrations of 20 and 40 ppm. At concentrations of 6, 10, and 20 ppm, the depression of apparent photosynthesis caused by the fumigations of SO₂ for 1 hr was restored to the original state almost 2 hr after the gas was removed, but not restored at treatment concentrations of 30 and 70 ppm. When the rice plant was fumigated with SO₂ at concentrations up to 20 ppm, S content in the leaves increased remarkably, showing only slight increase as the concentration of the gas became higher. The content of

S absorbed in the leaves increased in proportion to the length of fumigation period.

38707

APTIC NO. 61415

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. IV. EFFECTS OF SULFUR DIOXIDE ON RESPIRATION OF RICE PLANTS. (Sakumotsu no gasu shogai ni kansuru kenkyu. Dai4po: suito no kokyu sayo ni oyobosu SO₂ gasu no eikyo). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 38(4):593-597, Dec. 1969. 2 refs.

The effects of sulfur dioxide on the respiratory rate both at the seedling and at the highest tillering stages of rice plants were investigated at 30 C. The respiration rate of rice seedling decreased linearly with increasing concentration of SO₂. The respiratory rate of rice seedlings was suppressed by the treatment of SO₂ for 1 hr at a concentration of 60 ppm and showed no recovery after the gas was removed. At concentrations of 1, 4, and 10 ppm the seedlings responded intricately. The respiration rate at the highest tillering stage of rice plants was accelerated by exposing the plants to SO₂ at the concentrations of 1, 5, 10, and 15 ppm respectively. By the treatment of SO₂ at the concentration of 40 and 60 ppm, it was always retarded. As the treatment time was prolonged, the concentration of the gas effective to accelerate the respiration rate decreased. As to the accumulated value for 4 hr, the respiration rate increased linearly with increasing concentration of the gas. It showed the highest value at about a concentration of 5 ppm, thereafter declining with increasing concentration of the gas. Both an increase and a decrease in the respiration of rice plants treated by the gas may lead to decreases in dry matter production.

38708

APTIC NO. 61419

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. III. ON THE DEGREE OF INJURIES AND A KIND OF TYPICAL SYMPTOM OF INJURIES CAUSED BY H₂SO₃ SOLUTION SPRAY TO RICE PLANTS. (Sakumotsu no gasu shogai ni kansuru kenkyu. Dai3po: Aryusan sui no yomen sanpu ni yoru suito no shokai to shogai teido ni tsuite). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 38(2):222-228, June 1969. 15 refs.

Two kinds of typical symptoms of injuries caused by sulfur dioxide were observed on the leaf blade and sheath of paddy rice. Countless spots of brown color and lesions of white were observed at the tip of the leaf blade, interveinal, and sometimes, marginal part of the leaf blade and sheath. To verify the suspected causative agent, rice plants were sprayed with sulfuric acid solution either in the daytime or at night. Countless spots of brown color were identified as a typical symptom of injuries by H₂SO₃ solution spray either in the daytime or at night. No lesions of white color were observed in either treatment. Destruction of chlorophyll in the leaf brought about a decrease of chlorophyll content almost in parallel with the concentration of sulfur dioxide, afflicting severe damage to the 3rd and 4th leaves (numbered downward from the uppermost leaf). Chlorophyll content was in proportion to total dry weight of the plant. Sulfur content of the leaf was higher in the plant sprayed with H₂SO₃ solution in the daytime than in the plant sprayed at night. A higher content of sulfur was observed in the 3rd and 4th leaves of the plant sprayed in the daytime and the 2nd and 3rd leaves of the plant sprayed at night.

1968

38709

APTIC NO. 61417

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. I. RELATION BETWEEN THE CONCENTRATION OF SULFUR DIOXIDE AND THE DEGREE OF LEAF INJURIES IN SEVERAL CROPS. (Sakumotsu no gasu shogai ni kansuru kenkyu. Daiippo: Sushu Sakumotsu no ariyusan gasu nodo to yoman hakai teido to no kankei). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop. Sci. Soc. Japan), 38(3):366-371, Sept. 1968. 10 refs.

The mechanism of sulfur dioxide-induced injury of crops was investigated by fumigating the plants with SO₂, the concentrations of which were determined by an SO₂ analyzer. This allowed correlation between degree of leaf injury and gas concentration. In tobacco both the weight and area of the injured portion of the leaf increased with increasing concentration of SO₂. Both tobacco and barley showed greater damage at the flowering stage than at the vegetative stage. In paddy rice no significant difference in susceptibility was observed between the highest tillering stage and the booting stage. The relative resistance of crops to SO₂ was, in descending order, (vegetative stage) paddy rice, barley, tobacco, orchard grass, and alsike clover, and (reproductive stage) paddy rice, barley, and tobacco. There were two kinds of symptoms of SO₂ injury on the leaf blade and sheath of paddy rice: brown and brownish-red spots and white lesions.

38710

APTIC NO. 61418

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. II. RELATION BETWEEN INJURIOUS EFFECTS OF SULFUR DIOXIDE AND ILLUMINATION IN BARLEY AND RAPE. (Sakumotsu no gasu shogai ni kansuru kenkyu. Daiinbo: Hikari no yumu to natane oyobi hadakamugi no SO₂ gasu shogai to no kankei). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop. Sci. Soc. Japan), 38(4):608-613, Dec. 1968. 7 refs.

Rape and barley were exposed to 20 ppm sulfur dioxide in the dark and under conditions of light and 20 klux intensity. Rape and barley leaf injury in the dark was proportional to length of time of exposure. For rape in the flowering state, there was no difference in the extent of injury between light and dark conditions of exposure. In the vegetative stage, however, injury was more severe in the dark than in the light. For barley, injury was always more severe under conditions of light exposure than in the dark. Thy leaves of both plants absorbed sulfur under both conditions, but rape absorbed more in the light than in the dark. For rape, the absorption was proportional to length of time of exposure. Extent of leaf injury was positively correlated with the sulfur content of the leaves, but there was no visible damage to rape leaves.

1966

38711

APTIC NO. 60883

Lux, Herbert

DISTINCTION BETWEEN THE RESPECTIVE SHARES OF SEVERAL, SIMULTANEOUSLY ACTING GAS EMISSION SOURCES IN DAMAGES TO SYLVAN VEGETATION. (Beitrag zur Trennung des Schadanteils gleichzeitig auf die Waldvegetation einwirkender Abgasquellen). Text in German. Wiss. Z. Tech. Univ. Dresden, 13(6):1533-1535, 1966.

A method for the distinction between respective shares of several, simultaneously-acting gas emission sources in forest damages is presented. Damage zone charts, elaborated on the

basis of the symptoms of the actual forest damage, and charts of the pollutant concentration distribution for each individual emission source are necessary for this procedure. The concentrations are calculated with respect to fuel consumption, effective stack height, wind distribution and other meteorological conditions, distance between the emission source and the damaged forest, orographic conditions, and turbulence conditions. The sulfur dioxide distribution among the industrial plants possibly responsible for the forest damages is calculated and graphically added up so that a chart of the total concentration with relative SO₂ values is obtained. The damage area is determined planimetrically, and the value obtained for the area surface is multiplied by the concentration value. Industrial plants with high emission volumes are usually responsible for most damages. Plants with high stacks are responsible for less damages.

1965

38712

APTIC NO. 60897

Herbst, W.

FILTERING AND PROTECTIVE EFFECT OF FORESTS AGAINST RADIOACTIVE AND OTHER IMPURITIES OF THE ATMOSPHERE. (Filter- und Schutzwirkung des Waldes gegen radioaktive und andere Beimengungen der Atmosphäre). Text in German. Forst. Holzwirt Schaft, 20(10):216-220, 1965. 12 refs.

Studies on the filtering and protective effect of forests against radioactive and other air pollutants are reviewed. While forests do not represent a control for air pollution they do have a considerable relative protective effect against both particulate and gaseous air pollutants. The filtration efficiency of forests for particulate radioactive air pollutants is as high as for non-radioactive particulate matter. Experiments revealed much higher pollutant concentrations on the weather side of forests than on the lee side. Also, the dust deposits on leaves on the weather side were much higher than those on the lee side, even on the same tree.

1964

38713

APTIC NO. 60876

Kotaka, Sadao, Albert P. Krueger, and Paul C. Andriese

CATALASE ACTIVITY OF A CRUDE ENZYME PREPARATION FROM IRON-CHLOROTIC BARLEY (HORDEUM VULGARIS) SEEDLINGS. Nature (London), 204(4964):1198-1199, Dec. 19, 1964. 7 refs.

Air ions of either charge accelerate the development of iron chlorosis in barley seedlings cultivated in an iron-free nutrient solution. The mechanisms involved in this phenomenon were studied. The addition of Fe in the form of Fe-potassium-ethylene-tetraacetate (Fe-EDTA) to cell-free extracts prepared from barley seedlings which had developed chlorosis as a result of growth in an Fe-free culture medium in a normal atmosphere produced a marked increase in catalase activity of the extracts. The results indicated that the pattern of increase in catalase activity was related to the extent of chlorosis. The activity of the enzyme preparation made from nonchlorotic barley was not increased by adding 50 ppm Fe, although its initial catalase activity was the highest of those tested. The extract from severe chlorotic barley showed a marked increase in catalase activity after the addition of Fe-EDTA. The peak of activity appeared at 120 min and was followed by a well-defined decrease. The initial activity of this preparation was the lowest of those tested. In the case of recovered seedlings, the increase in catalase activity reached its maximum after 120 min incubation and remained at this level for the entire 6-hour period of observation. The catalase activity of this preparation was slightly lower than that from nonchlorotic seedlings.

205

1963

38714

APTIC NO. 60735

Schoenback, Helfried

STUDIES ON VEGETATION DAMAGES AROUND A TEXTILE DYEING PLANT. (Untersuchungen ueber Vegetationsschaeden in der Umgebung einer Stueckfaerberei). Text in German. In: Berichte aus der Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen. Rept. 4, p. 33-78, 1963. 32 refs.

Vegetation damages and growth anomalies occurring around a textile dyeing plant were studied to determine the cause of the damages. Symptomatology studies revealed such damages as growth anomalies, metamorphoses and conrescences of leaves, anisotropy, and departures from the natural correlations between plant parts. While dicotyledonous plants were primarily affected, damages occurred also in Gymnosperma and Pteridophyta. Tests on cress and other indicator plants identified the causative agent to be Palanil Carrier A, a product used in the adjacent textile dyeing plant. Palanil Carrier A has selective growth regulating properties. Necrosis and other local damages due to Remol TRF, another product used in the dyeing plant, were also observed.

1962

38715

APTIC NO. 60718

Pisut, Ivan

COMMENTS ON THE ACTION OF EMISSIONS ON THE LICHEN VEGETATION AROUND RUDNANY (NORTHEAST SLOVAKIA). (Bemerkungen zur Wirkung der Exhalationsprodukte auf die Flechtenvegetation in der Umgebung von Rudnany (Nordostslowakei)). Text in German. Biologia, 17(7):481-494, 1962. 17 refs.

Qualitative and quantitative changes in the epiphytic, epigeal, and epipetrous lichen flora around an iron ore-processing plant emitting sulfur dioxide and mercury in Rudnany (Northeast Slovakia) were studied. Within a radius of 2550 m around the plant, the SO₂ concentrations ranged from 0.005 to 0.015 mg/l. Increases in both the number and abundance of the lichen species with increasing distance from the emission source were determined. Three different pollution zones around the industrial plant were distinguished on the basis of the lichenological study: in strongly exposed zones in which higher plants also were damaged, all lichen species but a few specimen of epipetric lichens were absent. In a second, moderately exposed zone where no damage to higher plants were visible, both epiphytic and epigeal species, as well as Cladonia sp. were present. Cladonia spp. and Baeomyces roseus were the dominant species in this zone. In a third, slightly polluted zone, normal development of epiphytic associations, and dominance of Xanthoria parietina, Physcia grisea, Ph. orbicularis, Parmelia physodes, and P. sulcata were observed.

38716

APTIC NO. 60560

Woltz, S. S.

FLUORIDE TOXICITY IN GLADIOLUS AND METHODS OF AMELIORATION. Proc. Florida State Hort. Soc., vol. 75:469-471, 1962. 6 refs.

The protection of gladioli from fluoride by spraying is described. Fluorine leaf scorch symptoms were identified using specimens fumigated with 0, 0.48, 0.95, 1.9, 3.8, and 7.6 mg hydrofluoric acid. The leaf-tips and margins turned grayish-green the second day following exposure; by the third day the leaves turned grayish white or tan; by the end of a week the damaged area had a burned appearance with tan to dark brown color. In a field experiment, plants were exposed to fluoride sprays as pesticides under controlled conditions. Calcium, manganese, and magnesium had protective effects through the inhibition of metal-requiring enzymes. The field

experiment showed leaf scorch systems were produced on gladioli by sodium fluoride and hydrofluoric spray treatments, the effects of HF were almost as great, even though after drying any unreacted HF was lost to the atmosphere. No reduction in foliar toxicity resulted from soil applications of calcium sulfate, apparently due to a greater native calcium supply. Both sodium fluoride and HF were effective in foliar sprays used to stimulate fluoride leaf scorch.

1961

38717

APTIC NO. 54820

LeBlanc, Fabius

THE INFLUENCE OF POLLUTED AIR IN LARGE URBAN AGGLOMERATIONS ON THE CORTICOLINE EPIPHYTES. (Influence de l'atmosphère polluee des grandes agglomérations urbaines sur les epiphytes corticoles). Text in French. Rev. Can. Biol., 20(4):823-827, 1961. 9 refs.

The phytosociology of corticoline epiphytes in the Montreal area, Canada, was studied. Although corticoline epiphytes are particularly abundant in Southern Quebec, and especially in its mountainous regions, the trees investigated in the center of Montreal were completely free of epiphytes. Within a radius of 15 to 18 miles around Montreal, these plants reappeared, though they had reduced vitality. It was only outside this radius that societies of corticoline epiphytes became abundant and well developed. The absence of corticoline epiphytes in the center of Montreal, and the scarcity of such species around Montreal is most possibly due to the presence in the air of air pollutants, especially sulfur dioxide, which are toxic for these corticoline lichens, rather than to the extreme dryness of the air.

1958

38718

APTIC NO. 60841

Berge, Helmut

EMISSION DAMAGES ON AGRICULTURAL AND GARDEN PLANTS. (Immissionschaeden an landwirtschaftlichen und gaertnerischen Kulturen). Text in German. In: Immissionschaeden, Berlin, Paul Parey, 1958, p. 1-23. 24 refs. (Presented at the Landwirtschaftliche Hochschule Hohenheim, Hohenheim, West Germany, Dec. 2, 1958.)

General problems of emission damages to agricultural and forest plants are surveyed with special regard to sulfur dioxide-inflicted damages, and methods for the study of such damages are evaluated. The susceptibility of plants to specific pollutants is dependent on a variety of factors such as temperature; humidity and moisture contents; light conditions; wind; site; exposure; slope; the physical, chemical, and biological properties of the soil; and the influence of other plants, animals, and man. Pot experiments with test plants can not be applied to practical conditions concerning the effects of air pollutants on plants. In the light of recent studies, acute damages of external and/or internal plant parts, direct chronic effects resulting in functional troubles, and indirect chronic effects with manifestations in production and growth loss are distinguished. Particulate matter settling on leaves can act chemically and/or physically, depending on its composition, absorption, and solubility. It depresses assimilation, but it may also have beneficial effect during drought. Settling dust can also affect plants through the soil. Many plants are damaged by SO₂ concentrations as low as 0.3-0.5 mg/cu m. Apart from the number of stomata, the degree of opening of the stomata is of particular influence on the amount of the emission damages. The opening of the stomata is increased by such factors as temperatures above 5 C, abundant moisture supply, high relative humidity, and high light intensity. Plants are usually more resistant to sulfuric acid than they are to SO₂.

EFFECTS-MATERIALS

1974

38719

APTIC NO. 61594

Duncan, J. R. and D. J. Spedding

THE MODE OF INITIAL REACTION OF SO₂ AT A METAL SURFACE. *Corrosion Sci.*, 14(4):241-249, 1974. 25 refs.

Recently reported results from studies of the initial intersections between atmospheric sulfur dioxide and metal surfaces are reviewed in terms of a model based on traditional theories of reaction in an electrolyte solution at the surface and a model based on specific adsorption of the sulfur dioxide at the solution/metal oxide interface. Discrete areas of SO₂ adsorption, previously reported on iron, could also be identified on copper, aluminum, and stainless steel samples. The model based on specific adsorption was the better of the two, particularly in explaining: the differential uptake of SO₂ on metal surfaces; the quantities necessary to explain the fate of the adsorbed SO₂; and the kinetic data found for sulfate formation on Fe and zinc surfaces. (Author abstract)

38720

APTIC NO. 60383

Eyring, Henry, Blake Robertson, Chih Chien Chu, and Terrell Andersen

ATMOSPHERIC CORROSION (THEORETICAL MODEL). *Proc. Natl. Acad. Sci. U. S.*, 72(2):245-247, Feb. 1974. 4 refs.

A model of atmospheric electrolytic corrosion is developed, and it is shown that electrically conducting channels threading through the oxide layer of the metal and connecting anodic and cathodic areas obey the equation for a reactant being catalyzed by its product (autocatalytic reaction). Non-uniformity of the metal surface results in anodic and cathodic areas which preferentially catalyze their respective electron-donating and electron-extracting reactions. An autocatalytic equation is compared with available experimental data and found to be widely applicable and capable of unifying many experimental observations. (Author abstract modified)

38721

APTIC NO. 61572

Komeiji, Tetsuo, Tadashi Sawada, Toshio Ohira, Yoichi Yamamoto, and Morio Kadoi

ATMOSPHERIC CORROSION OF CARBON STEEL. (Tansoko no taiki fushoku ni suite). Text in Japanese. Tokyo to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 5:62-65, March 1974. 5 refs.

Atmospheric exposures of carbon steel were carried out at 5 locations in Tokyo with different degrees of air pollution, from Sept. 1970 to Jan. 1973. The degree of corrosion was higher during spring, summer and fall when temperature and humidity were high and rain was abundant. The corrosion at highly polluted commercial areas was remarkably greater than that at residential area. The degree of corrosion increased rapidly in the first 4 mo, but became moderate after that period. Positive relationships were observed between the corrosion and particulate concentration, measured by the conductivity method, and sulfur oxide concentration, measured by an automatic analyzer. However, negative relationships were found between corrosion and the concentrations of nitric oxide, nitrogen dioxide, and carbon monoxide.

38722

APTIC NO. 61893

Reuter, Manfred

DAMAGES OF AND RULES FOR FACILITIES DESIGNED FOR CONVEYING, CLEANING, AND TRANSPORTATION OF RAW NATURAL GAS. (Schaden und Vorschriften bei Anlagen zur Foerderung, Reinigung und zum Transport von Sauer gas). Text in German. VDI (Ver. Dert. Ingr.) Ber., no. 199:65-70, 1974.

Damages caused in steel materials used for the conveyance, cleaning, and transportation of raw acid natural gas with high hydrogen sulfide and carbon dioxide contents due to hydrogen embrittlement and hydrogen cracking are described, and a critical review given of the U. S. and Canadian specification on steel materials to be used in contact with such natural gas. At relatively low temperatures, and especially in the presence of CO₂ and water vapor, hydrogen sulfide causes embrittlement and cracking of steel in a rather short time. The U. S. and Canadian specifications for steel grades to be used in contact with raw acid natural gas limit the maximum hardness to 22 HRC.

38723

APTIC NO. 61454

Wefing, Martin, Karl-Heinz Schmitz and Karl-Friedrich Wesemann

CORROSION DAMAGE TO ELECTRIC GAS CLEANING EQUIPMENT. (Korrosionsschaeden an Elektro-Gasreinigungsanlagen). Text in German. *Stahl Eisen* (Duesseldorf), 94(3):81-84, Jan. 31, 1974.

The facilities for cleaning the top gas from a blast furnace include scrubbers and a total of seven electrostatic precipitators each with three fields. The top gas throughput through the cleaning facility fluctuated between 80,000 and 100,000 cu m per filter. The gas entrance temperature is 35 C, the exit temperature 28 C. The plant has a pressure loss of 50mm water. The ionizing frames and rods as well as the collection electrodes are of steel St 37, the isolators of ceramic. Until 1971 the filter operated without trouble. The precipitator is automatically cleaned by spraying larger amounts of water alternately from the top and in the direction of the gas flow. The water is cleaned to a residual concentration of suspended particles of 20 to 40 mg/liter. Since mid-1972 heavy corrosions were observed, first on the ionizing electrodes. In order to find the source of the corrosions, the sludge in the filter, the uncleaned and cleaned gas, and the water were examined. Parallel to that the deposits in the top gas turbine and in the burner of the blast heater were examined. It was found that the dust in the top gas consisted of about one third to one fourth of carbon, and contained small amounts of sulfur in the form of sulfur dioxide which is largely scrubbed out of the gas. The sludge deposited in the filter contained an oxide mass similar in appearance to the top gas dust which was glued together by a jelly-like substance. These deposits also contained copper, sulfur dioxide and chloride which corrode steel. The existence of the jelly-like mass could be explained by the higher injection of fuel oil into the furnaces and the switch of the filters to automatic spraying with water. It was decided to flush off the sludges more efficiently and to install stainless steel (X 5 CrNiMo 18 10) ionizing electrodes. The arrangement of the isolators was changed so that any deposition of soot was prevented.

1973

38724

APTIC NO. 61286

Kaiho, Yuichi

EFFECT OF AIR POLLUTION ON OPEN-AIR STRUCTURES - THE CASE OF RAILROAD FACILITIES MATERIALS. (Okugai kozobutsu no taikiosen ni yoru eikyo - tetsudo shisetsu zairyo no baai). Text in Japanese. Bosei Kanri (Rust Prev. Contr.), 17(12):11-15, Dec. 1973. 7 refs.

Air pollution causes damage to railroad facilities, such as increasing the contact resistance of the relay contact points and various terminals, rusting of terminals, deterioration of instrument coatings, and corrosion of zinc-plated wires. Therefore, exposure tests were made of steel, zinc, aluminum, and copper at several stations. Sulfur oxides, nitrogen oxides, chlorides, sulfides, dust, and soot were measured. The average amount of corrosion was 23.9 mg/sq dm/day for the industrial area, 33.2 for the sea coast, 8.3 for streets, and 4.4 for rural areas for carbon steel. These results were 0.54, 0.86, 0.48, and

287

0.19, respectively, for zinc specimens. In general, the corrosion resistances of aluminum and stainless steel were greater than of the other specimens.

38725

APTIC NO. 56613

Riederer, Josef

THE DAMAGING EFFECT OF AIR POLLUTANTS ON WORKS OF ART. (Die schädigende Einwirkung luftverunreinigender Stoffe auf Kunstwerke). Text in German. Proc. Int. Clean Air Congr., 3rd, Duesseldorf, West Germany, 1973, p. A86-A89. 21 refs.

Examples of the deterioration of stones and works of art in Germany, and possible protective methods are described. Bronze statues were found to have been attacked by sulfur dioxide, and to have formed a crust of soot, and dust on the corroded surface. The efficiency of resin-, wax- and oil-coatings on bronze sculptures is being studied in weathering tests. Regular cleaning, removal of crust, and surface coating are among the principal possibilities of the protection of bronze sculptures. Observations indicating largely equal rates of stone deterioration in industrial and rural areas, and the much higher rate of deterioration of sandstone as compared with limestone suggest that such damages are due to weathering rather than to the effect of air pollutants. Glass paintings have been damaged by SO₂ which forms hard crusts on the outer surface in the form of sulfates, and causes point corrosion in inclusions. Paintings, and objects made of textile materials, leather, and paper are attacked by gaseous air pollutants, especially by SO₂.

38726

APTIC NO. 61262

Sedlov, I. and W. Kojucharov

THE CORROSION RESISTANCE OF CHROMIZED PARTS IN SEA AND INDUSTRIAL ATMOSPHERES. (Ueber die Korrosionsbeständigkeit von chromierten Teilen in See- und Industriatmosphäre). Text in German. Werkstoffe Korrosion, 24(12):1039-1041, 1973. 6 refs.

Sheet, steel samples and screws were exposed for one year to an industrial atmosphere containing 0.0102 mg/l sulfur dioxide, 0.032 mg/l sulfur trioxide and 0.001 mg/l ammonia. The Maritime climate to which similar were exposed for one year contained an average SO₂ concentration of 0.021 g/sq m/day, and an average chloride ion concentration of 0.028 g/sq m/day. No major difference was found between the corrosion in industrial and in sea atmosphere. The samples showed little resistance in both cases. Corrosion resistance is primarily determined by the thickness of the diffusion layer. The shape of the parts plays an important part too; the corrosion resistance is lower when notched shapes are used. The conditions of the diffusion process have little effect on the corrosion resistance. Generally, the protection afforded by the chromizing layer is not sufficient under the conditions studied. Even with a thickness of 80 microns the useful life does not exceed one year. The reason for this low resistance is primarily the imperfect structure of the coating which inhibits the formation of the passive chromium oxide layer.

38727

APTIC NO. 61285

Takashiba, Yoshihiro, Kenji Ito, Yuzuru Murata, Hirotake Kaiiwa, and Hisahiro Fujimoto

STUDY ON RELATION BETWEEN AIR POLLUTION AND METAL CORROSION IN OWASE CITY (I). (Owase-shi ni okeru taiki osen to kinzoku fushoku no kankei ni tsuite (I)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):408, Oct. 1973. (Presented at the Japan. Society of Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973, Paper 144.)

The results of an investigation of air pollution on metal corrosion in Owase and vicinity over a year are presented. Owase is situated in a basin and has thermal power plants and petroleum refineries. Control areas were chosen from the coast (7

and 20 km from the city) and the mountain (30 km from the city). Iron, copper, and zinc plated iron pieces were exposed to the air at an angle of 30 deg, facing south. Sulfur oxide measurements were taken simultaneously by lead dioxide and air pollution meters, and settling particles were measured by simple dust meters. The post treatment of metals were given by electrolysis (iron), organic solvent scrubbing (copper), and 2% ammonium chloride washing (zinc covered iron), and the weight differences were measured as corrosion determination. The SO_x measurements and sulfate ion and metal corrosion showed correlation within 10% risk rate both in summer and winter. The SO₄ ion content in settling particles and copper corrosion showed a particularly close correlation within 2.5% risk rate. All the corrosion rates were greater in summer than in winter. The corrosion rate in the city was slightly higher than in control areas.

1972

38728

APTIC NO. 68745

Carter, C. S., M. V. Hyatt, and J. E. Cotton

STRESS-CORROSION SUSCEPTIBILITY OF HIGHWAY BRIDGE CONSTRUCTION STEELS. EXTENDED REPORT ON "PHASE I. FINAL REPORT. Boeing Co., Seattle, Wash., Commercial Airplane Group, Federal Highway Administration Contract DOT-FH-11-7836, Work Unit FCP 35F2-022, Rept. FHWA-RD-73-46, Boeing Rept. D6-60159-2, 300p., April 1972. 303 refs.

NTIS: PB-222453

A catalog of steels used in highway bridge construction has been developed. A state-of-the-art survey on the stress-corrosion susceptibility of these steels has been conducted. The types and concentrations of corrosives that can be experienced in the highway environment have been established. Atmospheric pollutants considered include sulfur oxides, nitrogen oxides, hydrogen sulfide, ammonia, and suspended particulate matter. Carbon steels (A7, A9, A36, and A373), which have been used predominantly in bridge construction, are not susceptible to stress-corrosion cracking in the highway environment. Insufficient information is available to assess the stress-corrosion resistance of higher-strength steels with the required level of confidence. Fracture mechanics-type tests are proposed to obtain this information in experimental environments including H₂S, sulfur dioxide, and ammonium nitrate. Laboratory tests were conducted for 100% relative humidity air containing 5 ppm H₂S, 100% relative humidity air containing 50 ppm SO₂, and an aqueous solution containing 5% ammonium nitrate. Field tests will be conducted by exposing specimens at six sites, two of which will be near Continuous Air Monitoring Project stations so that the atmospheric pollutant concentrations can be continuously monitored during their action on the steels.

1967

38729

APTIC NO. 12680

Ede, J. R. and W. H. Langwell

SULPHUR DIOXIDE AND VAPOUR PHASE DEACIDIFICATION. Conf. Museum Climatol., London, England, 1967, p. 37-40. 8 refs.

Strong acids, such as sulfuric and hydrochloric, are perhaps the chief agents causing the premature breakdown of leather and cellulosic materials such as wood, paper, cardboard. The cause of the accumulation of H₂SO₄ has been laid at the door of the small amount of sulfur dioxide present in most industrial atmospheres aggravated by certain metallic impurities introduced into manufactured leather and paper. This SO₂ can readily react with the oxygen in the air, especially with the aid of some catalytic metals such as iron, manganese or copper, to produce the dangerous H₂SO₄. For leather the addition of a small amount of potassium lactate, potassium citrate, or acid

sodium, pyrophosphate will render it immune to atmospheric SO₂. An analogous effect can be produced in paper by ethylene diamine tetraacetic acid, acid sodium pyrophosphate, acid sodium oxalate, acidified potassium ferrocyanide, and other complexing agents. The neutralization of the acid present in the materials of the archivist, museum curator, or librarian is discussed. Vapor phase deacidification is unlike any of the previous methods in that a dry gaseous alkali is used, which eliminates the need to wet the paper and reduces the amount of manipulation required to negligible proportions. Cyclohexylamine as the carbonate has so far given excellent results. This method is discussed, and the toxicity of cyclohexylamine carbonate is considered.

38730

APTIC NO. 10175

Goss, J. R.

CORROSION BY AIR POLLUTION - A REVIEW. Nat. Soc. Clean Air Proc. Ann. Conf., no. 34:75-92, 1967. 47 refs.

A literature review is presented of the chemical and physical effects of air pollution on stonework and building materials, metals, textiles, leather, paper, rubber, and paint. Coal smoke and sulfur dioxide are the chief pollutants considered. Various metals which are considered include aluminum, copper, iron, lead, zinc, gold, and silver. Mechanisms and the costs of corrosion are discussed. (Author summary modified)

EFFECTS-ECONOMIC

1974

38731

APTIC NO. 60994

White-Stevens, Robert H.

EFFECT OF AIR POLLUTION ON FOOD PRODUCTION AND GROWTH. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 41p., 1974. (Presented at the Air Pollution Control Association, Mid-Atlantic States Section, Semi-Annual Technical Conference, Philadelphia, Pa., April 25, 1974.)

Estimates of the economic impact of air pollution upon crops, livestock, forests, parklands, landscape areas, and wildlife are provided along with a review of the impact of such pollutants as carbon monoxide, sulfur oxides, nitrogen oxides, photochemical oxidants, ozone, ammonia, and particulates (dusts, suspended, metal) on animal biological activity and livestock production in particular. The Council on Environmental Quality estimated in 1970 that total livestock and plant damage losses aggregated \$500 million per annum. Such estimates based on surveys have not included indirect costs which could readily double the estimated losses. Few economic studies have been performed to assess fiscal losses in livestock production attributable to air pollution, with the exception of ammonia and dust pollution among broiler flocks in confined housing. Experimental data indicates that frank physiological and pathological disturbances only occur as a result of acute episodes of exposure to SO₂, NO_x, O₃, peroxyacyl nitrates, ammonia, dusts, metallic particulates, and their combinations at levels greater in excess (10-1000 fold) those likely to be experienced on farms; although the effects of chronic low level continuous exposure are considerably more subtle and elusive, and virtually no hard economic data is available.

1973

38732

APTIC NO. 60924

Guntermann, Karl L.

AIR POLLUTION CONTROL IN THE SECONDARY ALUMINUM INDUSTRY. Land Economics, 1973:285-293, 1973 (7). 33 refs.

Estimates of the cost of air pollution abatement for the secondary aluminum industry are developed for several alternative emission standards. Estimates are made for emission standards that require complete abatement, an intermediate standard of 58% abatement, and a standard requiring complete control for urban smelters and intermediate control for rural smelters. Complete abatement appears substantially more costly than the intermediate standard because of expenditures for caustic. The rural standard is intermediate in cost. A cost-benefit analysis of a rural secondary smelter indicates a low level of damages relative to control cost, and preliminary data on the impact of pollution control on individual firms indicate that cost differentials exist favoring large smelters. The impact of control costs appears to be moderate with no serious effects on sound firms. Control cost comparisons between primary and secondary producers indicate a significant advantage favoring secondary producers. The high cost of abatement relative to abatement costs for substitute materials and the high elasticity of demand for aluminum indicate that the consumption of aluminum could be affected substantially by stringent air pollution standards. (Author summary modified)

38733

APTIC NO. 61445

Makino, Kazutaka and Nobutoshi Tanaka

INTRODUCTION TO THE OPERATION OF BAG FILTERS AND THEIR MOST ECONOMICAL CONSTRUCTION. (Bag filter no sosa to keizai saiteki sekkei e no nyumon). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 2(11):820-823, Nov. 1973. 1 ref.

Economical considerations for the design and use of bag filters are discussed. The fixed and operational costs of the bag filter, the fixed and operational costs of the fan, maintenance of the filter fabric, and the original cost of the filter cloth itself are considered. The fixed cost of the bag filter is proportional to the filtering area of the bag. Maintenance costs of the filter are proportional to the area of the bag filter and inversely proportional to the life of the filter material. The fixed and operational costs of the fan are proportional to the amount of treated gas and the loss of operating pressure.

38734

APTIC NO. 60570

McGlamery, G. G., D. A. Waitzman, J. L. Nevins, and G. A. Slappey

MARKETING SULFURIC ACID FROM SULFUR DIOXIDE ABATEMENT SOURCES. PHASE I - THE TVA HYPOTHESIS. Preprint, Tennessee Valley Authority, Muscle Shoals, Ala., 34p., 1973. (Presented at the Electrical World Conference Waste Disposal in Utility Environmental Systems: The Problem Beyond Removal, Chicago, Ill., Oct. 30-31, 1973.)

A hypothetical study was performed by the Office of Agricultural and Chemical Development of the Tennessee Valley Authority to assess the economics of marketing sulfuric acid which theoretically could be produced from its coal-fired steam plants by by-product control systems. The assumed volume of acid production from the TVA system, with no competition from other sources, is marketable at a positive net sales revenue if the value is zero at the point of production. The location of acid plants and power plants heavily influences the results because of the importance of transportation costs. The most orderly way to incorporate abatement acid into the market could be to replace sulfuric acid produced from purchased sulfur, although higher revenues could be derived by converting the acid to fertilizer. A useful, expandable computer model was developed to predict the impact of abatement acid on the United States Markets. (Author conclusions modified)

38735

APTIC NO. 55914

Environmental Protection Agency, Washington, D. C.

CLEAN AIR AND THE AUTOMOBILE. Preprint, 32p., 1973.

Cost implications of the Federal emissions standards in the context of the need for the nationwide air pollution clean-up mandated by the Clean Air Act are discussed. The primary health standards for oxidants, hydrocarbons, and carbon monoxide appear to be exceeded in a large number of Air Quality Control Regions. Control of the automotive pollutants to the statutory 90% reduction will bring most of these regions within the oxidant and CO standards by 1985, although as many as 12 regions may still require supplemental controls. Evidence further indicates that the mandated 90% reduction of nitrogen oxide emissions is not required at this time. Transportation control should be considered as complementary measures rather than as alternatives to mandated reduction in automotive pollutants because of the uncertainties associated with the social and economic cost and effectiveness of them. Technologies such as the diesel or stratified charge may prove to be superior to catalytic means, though such an outcome is not certain. Lack of data prohibits a full cost-benefit analysis of the automotive pollutants health standards. However, a comparative cost analysis shows that the total cost of an emissions system capable of meeting the stringent HC and CO standards and a relaxed NOx standard is commensurate with other automobile-related costs incurred by the consumer in the purchase and use of a relatively few automobile convenience options. (Author conclusions modified)

1972

38736

APTIC NO. 60596

Ayres, Robert U.

A. MATERIALS-PROCESS-PRODUCT MODEL. In: Environmental Quality Analysis. A. V. Kneese and B. T. Bower (eds.), Baltimore, Johns Hopkins Press, 1972, Chapt. 2, p. 35-67. 5 refs.

An economic and technical model for environmental management is proposed. The model is based on three fundamental classifications: materials based on physicochemical composition and mode of utilization; processes based on the relations between the number and the type of material outputs; and final products grouped by the Standard Industrial Classification code. The model is a generalization of the Walras-Cassel general equilibrium model, extended to include intermediate consumption by process and also including unpriced material inputs such as air and water, and unpriced outputs (residuals) such as combustion products and solids.

38737

APTIC NO. 60674

Lakshmanan, T. R., Fu-chen Lo, and Krishna Moorthi

THE OAP REGIONAL ECONOMETRIC MODEL: THE REVISED VERSION. VOLUME 1: MODEL REVISION AND SIMULATION. FINAL REPORT. CONSAD Research Corp., Pittsburgh, Pa., Office of Air Programs Contract 68-04-0039, Rept. APTD-1455, 220p., Sept. 25, 1972. 9 refs.

A policy-oriented regional economic model, termed the OAP (Office of Air Programs) Regional Econometric Model, for describing the economic system-wide effects of specific air pollution strategies in 91 metropolitan areas of the United States is described in terms of model development and revision. Topics covered include: the history of model development and previous experience with the utilization of the model; conceptual formulation and statistical estimation of the revised model; simulation analysis with the revised model; validation of the revised model using a series of statistical tests; and a case study of economic-environmental interaction in the Philadelphia Air Quality Control Region which attempts to integrate and utilize some existing modeling efforts such as the Direct Cost of Implementation Model, the property value damage functions, and the OAP Regional Econometric Model.

210

38738

APTIC NO. 60693

Tybout, Richard A.

PRICING POLLUTION AND OTHER NEGATIVE EXTERNALITIES. *Bell J. Econ. Manag. Sci.*, 3(1):252-266, Spring 1972. 15 refs. Frech, H. E. Pricing of Pollution: The Coarse Theorem In The Long Run. *Ibid.*, 4(1):316-319, Spring 1973. 15 refs. Tybout, Richard A. Pricing of Pollution: Reply. *Ibid.*, 4(1):320-321, Spring 1973. 5 refs.

Equilibrium conditions are examined for pollution or externalities of production treated as substitute products, and the results are contrasted with those based on traditionally assumed fixed proportion between product and waste outputs. The neutrality of bribery or compensation argument is refuted by showing that with linear homogeneous production functions compensation leads to exhaustion of product while bribery does not. Requirements are described for certain selected production functions and conditions that can lead to positive aggregate profits in a bribe-paying industry, and the analysis is applied to a number of related issues such as the blackmail problem, third party pricing, and public goods aspects. (Author abstract modified)

38739

APTIC NO. 60954

INVESTMENTS ENVISAGED IN THE POLLUTION CONTROL AREA. (Previsions d'investissements dans le domaine de la lutte contre la pollution). Text in French. Preprint, 6p., June 1972. 11 refs.

Different predictions concerning the investments for environmental protection in the U.S.A. during the period of 1970-1980 are presented. Out of a total of \$107,000,000,000, some \$23,700,000,000 will be spent on air pollution control, including \$16,000,000,000 for industrial air pollution control, and \$6,000,000,000 for automotive exhaust control. The total investment for clean air during the 1972-1977 period is estimated at \$42,000,000,000 by the EPA. The control of gaseous and particulate pollutants will cost \$300,000,000 in 1975, \$450,000,000 in 1978, and \$600,000,000 in 1980, up from \$150,000,000 in 1970 and \$225,000,000 in 1973. Instrumentation for pollution measurements will cost some \$500,000,000 during the 1970-1980 period.

1971

38740

APTIC NO. 60623

Brzoza, T.

FINANCIAL, FISCAL AND OTHER ECONOMIC MEASURES AND POLICIES INCLUDING SUBSIDIES AND COMPENSATION, APPLIED IN THE SOCIALIST COUNTRIES OF EUROPE FOR THE PROTECTION OF THE ENVIRONMENT. United Nations Economic Commission for Europe, New York, ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971. p. 203-209. (May 2-15.)

The main types of activity of a financial, fiscal, and generally economic nature applied by individual socialist countries of Europe for the protection, development, and rehabilitation of the environment are reviewed. The countries discussed include Bulgaria, Czechoslovakia, Hungary, Romania, Yugoslavia, USSR, and the German Democratic Republic. General features of the political and economic systems governing action in the area of environment protection are described. Investments for the protection of the environment and for dealing with problems related to the urban environment are outlined for the air, water, agricultural areas, forest areas and the conservation of nature, and the landscape. Financial resources are described for solution of noise, solid waste, and pollutant problems. Other types of financial and fiscal actions for the protection of the human environment are reviewed including penalties and damages, taxation, and price policy. Social activities in the

area of protection, development and rehabilitation of the environment and new economic initiatives to promote improvement of the environment are also mentioned.

38741

APTIC NO. 60531

Dahmen, E.

PROBLEMS OF ENVIRONMENTAL POLICY IN RELATION TO GENERAL ECONOMIC POLICY. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 263-269. (May 2-15.)

Two aspects of the standard of living are consumption and environmental qualities. Because of the scarcity of resources, the problems of efficiency and optimal resource allocation must be considered in order to allocate available resources to consumption and environmental quality. These factors are analyzed in a socio-economic interpretation of environmental policy, environmental degradation, and depletion of natural resources. The goals and conflicts of goals in environmental policy and ways and means of attaining these goals are reviewed.

38742

APTIC NO. 60600

Hronsky, F.

THE RELATIONSHIPS BETWEEN ENVIRONMENTAL QUALITY AND THE SOCIO-ECONOMIC DEVELOPMENT OF SOCIETY. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 297-301. 1 ref. (May 2-15.)

The long-range relationship between environmental quality and the socio-economic development of society is generally reviewed. Long- and short-range goals which society wishes to attain in its development and the integrating factor which can best function as a leading link in the interdisciplinary approach to the problem of the development of society both in science and in social practice must be determined to analyze the relationship between environment and socio-economics. The living standard is one of the goals discussed. The question of priorities is important in determining the relationships between the environment and the socio-economic development of society. The close relationship between economic growth and general progress and the impairment of the environment is quite evident. Since the environment is one aspect of the living standard, if it is decreasing in quality, the living standard may also be said to be decreasing; therefore the environment must always be considered when determining socio-economic effects of increased industrialization and economic growth.

38743

APTIC NO. 60510

Kneese, A. V.

THE BENEFIT-COST ANALYSIS OF ENVIRONMENTAL POLLUTION. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 269-286. 23 refs. (May 2-15.)

The advantages of cost-benefit analysis are described related to improved air and water pollution control. Various factors in cost estimation are reviewed including uncertainty of cost estimation, property values, unemployment and underemployment, and cost-effectiveness analysis. The problems of cost estimation, while not as severe as those of benefit estimation, have often been underrated. Some cases of cost-benefit and cost-effectiveness analysis are described. These include the Delaware Estuary, the Great Miami Basin, and water quality. Cost-benefit analyses in economics like that of the U. S. and in centrally planned economics are discussed. Appendices are given describing shadow prices for underemployment and unemployment, the water quality problem in the Delaware Estuary, and the Russell-Spofford model which consists of a linear programming inter-industry model and environmental diffusion models.

38744

APTIC NO. 60962

Leszczycki, Stanislaw

THE FOUNDATIONS OF SOCIO-ECONOMIC POLICIES CONCERNING THE ENVIRONMENTAL. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 290-297. 1 ref. (May 2-15.)

The socio-economic policies concerning the improvement of the environment are intended to determine the optimal allocation of resources between such improvements and other needs of society. The scientific foundations of such policies can be provided by the study of the system of interactions between man and the environment which can be viewed as a system of positive feedback relationships. The fundamental premises for the definition of environment include the laws and forces of nature, the expansion of human activity, the influences of nature on man and his activity, the influences of human activities on the environment, the limited potential resources of the environment, the model of human activities in space, man's activities which concentrate, and the accumulation of disfunctions. The three zones of the human environment are urban-industrial agglomerations, intensive productive and nonproductive activities, and potential resources and values of the natural environment. The pattern of activities responsible for the disfunctions in the three zones of the environment, the spread of disfunctions in the three zones, and scientific foundations of environmental policies are discussed generally. The application of the concept of environmental zones to an individual country is reviewed. In each European country, specific zones of environmental policy can be distinguished from the point of view of land use and of intensity and quality of environmental disfunctions. These areas include cores which are centers of urban-industrial agglomerations, urbanized areas (suburban), areas undergoing urbanization, agricultural areas, forest areas, surface waters, transportation areas, recreation and tourism areas, other, and waste land. The socio-economic problems in these areas as related to environmental problems are reviewed. The implementation of environmental policies is mentioned.

38745

APTIC NO. 60533

Stahl, I.

FINANCIAL, FISCAL AND OTHER ECONOMIC MEASURES AND POLICIES INCLUDING SUBSIDIES AND COMPENSATION. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 210-217. (May 2-15.)

A discussion of environmental problems and policies is given which mentions the choice of an organizational framework to select those activities that are favorable (or least unfavorable) from an over-all point of view, taking into consideration the welfare of all individuals, or to suppress those activities that are obviously harmful or whose effects are uncertain, but which might cause different kinds of long-term damages. The criteria for evaluation of environmental policies, environmental problems and market failure, and policy measures are discussed. Policy measures include increases in prices, regulations, taxes, and subsidies.

38746

APTIC NO. 60642

United Nations Economic Commission for Europe, New York
AN INTRODUCTORY REVIEW OF ATTEMPTS TO INCORPORATE ENVIRONMENTAL ISSUES INTO SOCIO-ECONOMIC THINKING AS PRESENTED IN RECENT LITERATURE. Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 258-262. 43 refs. (May 2-15.)

Recently, several attempts have been made to incorporate environmental issues into socio-economic thinking. The efforts of economists to rationalize the various variables and externalities (public goods, discount rate problems, and uncertainties) can lead to better environmental decisions. The various

economic considerations which must be taken into account in environmental decision making are reviewed, including positive economics and welfare economics are described. The cost-benefit approach is discussed. Externalities, public goods, conflicting preferences, the time factor (bequest theory), risks, uncertainties, and limited knowledge are described as factors in cost-benefit analyses.

STANDARDS AND CRITERIA

1974

38747

APTIC NO. 61257

Fujii, Shoichi

PREVENTION OF INDOOR AIR POLLUTION. (Shitsunai kuki o sen boshi). Text in Japanese. Preprint, Japan Air Cleaning Assoc., Tokyo, p. 1-12, 1974. (Presented at the Technical Training Conference on Air Cleaning, 12th, Tokyo, Japan, March 27, 1974.)

Dust and other indoor air pollutants are discussed with their allowable concentration limits. The chemical pollutants for which allowable concentrations in the working environment have been set up are listed. They include acetone, aniline, 2-aminoethanol (monoethanol amine), ammonia, carbon monoxide, ethyl methyl ketone, and some forty others. The criteria for the working environment presuppose that workers work in such an environment only during daytime work hours. The standards applicable to the general public are much stricter than the former, the latter value being 1/10-1/100 of the former. The generally accepted control criteria for indoor air pollution are 0.15 mg/cu m or lower for suspended dust, 10 ppm or lower for carbon monoxide, and 1000 ppm or lower for carbon dioxide. Concentrations of carbon monoxide, oxygen, and carbon dioxide in air are reviewed in relation to poisoning or breathing difficulty in humans. A general picture of urban air pollution in the major cities is also presented. Emission or generation sources of indoor dust, carbon monoxide, vapors, and harmful waste gases are listed. Also given are several types of air-conditioning and ventilation systems.

38748

APTIC NO. 61173

HARMFUL GAS CONTROL STRENGTHENED AND CONTINUOUS MEASUREMENT OF WASTE WATER MADE COMPULSORY IN TOKYO. (Tokyo-to no yu-gaisu kisei kyoka to haisui renzoku sokutei no gimuka). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(4):61-65, April 1974.

When officially approved by the Metropolitan Assembly of Tokyo, the revised control criteria for harmful gases will become effective as of Jan., 1975 and the continuous measurement of waste water will be made compulsory as of Oct., 1974. New or revised criteria are recommended for acrolein, phenol, pyridine, mercaptans, styrene, carbon monoxide, sulfur dioxide, and chlorinated sulfonic acid. They are more stringent than the national control criteria; 5 ppm at the exit for acrolein, 50 for phenol, 10 for pyridine, 10 for mercaptans, 50 for styrene, 100 for carbon monoxide, 100 for sulfur dioxide, and 1 mg/cu m for chlorinated sulfonic acid. An enterprise or plant giving effluent or waste water amounting to 500 cu m or more a day is required to perform continuous measurement of the effluent or waste water. Of 2192 plants or enterprises located in Tokyo, 198 plants fall under this category. These plants produce the waste water of 4,292,000 cu m/day accounting for 66% of the total waste water output (6,500,000 cu m/day) of Tokyo. The designated measurement methods are also discussed.

212

1973

38749

APTIC NO. 60617

Bach, Wilfrid and Anders Daniels

ON THE CONCEPT OF LIMIT VALUES, AND THEIR SIGNIFICANCE IN CLEAN AIR MAINTENANCE. (Zum Begriff der Grenzwerte und ihre Bedeutung in der Luftreinhaltung). Text in German. Chem. Rundschau (Solothurn), no. 26:1-3, 5, 1973. 32 refs.

General concepts and significance of limit values in clean air maintenance, as well as emission standards and maximum allowable concentration values adopted for different air pollutants in the USA, Canada, West Germany, and Switzerland are discussed. In the USA, maximum allowable concentrations have been established for suspended matter, sulfur dioxide, carbon monoxide, hydrocarbons, oxidants, and nitrogen dioxide. Maximum allowable emission standards for asbestos, beryllium, and mercury have been proposed. Emission standards have been elaborated for SO₂, sulfuric acid, and nitrogen oxides in fossil fuel firing industrial equipment, waste incinerator plants, for sulfuric acid and nitric acid production plants, and for portland cement works. Special concentrations of SO₂, dust, CO, oxidants, and nitrogen dioxide for the alert, warning, and emergency stages in hazardous pollution situations were elaborated. The CO, hydrocarbon, and nitrogen oxide emission standards for automobiles to be built in 1976 are set at 3.4 g/mi, 0.41 g/mi, and at 3.0 g/mi. In Switzerland, the automobile exhaust CO content is limited to 4.5%, and the lead content in gasoline is limited to 0.4 g/l.

38750

APTIC NO. 60364

Ginjaar, L. and P. Winkel

CRITERIA FOR A DIFFERENTIATED ENVIRONMENTAL MANAGEMENT POLICY. Atmos. Environ., 7(12):1187-1190, 1973.

Criteria for a differentiated environmental management policy are proposed based on combined regional and world-wide standards. Standards are divided into three categories: standards for pollutants with world-wide effects, especially of irreversible character; standards for pollutants with a world-wide effect which can be tolerated up to a certain level; and standards for pollutants with a local effect. Agreement of the standards for the first category should be obtained in international considerations, and priorities and measures for adequate inspection should be adopted. Standards in the second category should be established in international cooperation and agreement which should include decisions as to which pollutants belong to this category and how large an emission is allowed for each pollutant. The standards of the third category should be based on regional or national bases. International discussions on acceptable principles concerning effects on ecosystems are necessary, and these may lead to different standards in different countries and regions.

38751

APTIC NO. 60366

Iwata, Koichi and Tadasuke Sakai

CURRENT ASPECT AND PROBLEMS OF AUTOMOBILE PUBLIC NUISANCE CONTROL. (Jidosha kogai kisei jo genjo to mondaiten). Text in Japanese. Jokoshi Gijutsu (Automobile Eng.), 27(11):1287-1296, Nov. 1973.

Automotive exhaust gas control standards in the U. S. and Japan are reviewed, with special attention to the U. S. Clean Air Act of 1970. The reasons behind the recent Environmental Protection Agency postponement of enforcement of the 1975 standards are discussed. The EPA recently admitted errors made in measurement of atmospheric nitrogen oxides by the reference method which will require reevaluation of the situation. Results obtained by the new EPA method, arsenite method, and chemiluminescent method are compared with those obtained by the conventional reference method. The en-

environmental standards for sulfur dioxide, carbon monoxide, hydrocarbons, suspended dust, and control criteria for fuel additives are all discussed at length. The Japanese automotive emission control criteria are practically the same as those set forth in paragraph B(1), Article 262, Title II of the U. S. Clean Air Act of 1970. According to the Japanese criteria the maximum CO emission should be 2.1 g/km, HC 0.25 g/km, and ONx 1.2 g/km for 1975. For 1976 the same criteria are 2.1 g/km, 0.25 g/km, and 0.25 g/km. Public hearings on these new emission standards led to the conclusion that no technical problems will hamper the enforcement of these standards starting in April 1975.

38752

APTIC NO. 60347

Shidara, Masao

AIR POLLUTION AND URGENCY OF ITS CONTROL. (Taiki oson to sono taisaku no kinkyusei). (2). Sangyo Kogai (Ind. Public Nuisance), 9(12):1187-1198, Dec. 1973. 20 refs.

The Japanese policy on nitrogen oxides control and environmental standards for NOx are discussed. After 8 yr the concentration should be cut to 30 ppm, assuming concurrent progress in control techniques. On August 10, 1973 temporary control measures were taken aiming at reducing present concentration by 40%. Sources such as boilers, furnaces, and nitric acid plants have come under control with existing facilities getting a 2 or 3-year grace period. New sources must comply immediately. Measures to control generation of both thermal and fuel nitric oxide, as well as for elimination of NOx from stack smoke are discussed.

38753

APTIC NO. 56710

Shuttlesworth, Gregory J.

GASOLINE DEMAND AND AUTOMOBILE EMISSION CONTROLS. Petrol. Situation, 1973:2-3, March, 30, 1973.

Current trends in gasoline shortage reflect two basic conditions: first, refining capacity is not increasing as needed because of environmental restraints and secondly, automobile emission controls are resulting in a loss of fuel burning efficiency. Approximately one-half of the expected growth of gasoline demand in 1973 will represent additional fuel consumption due to emission controls. Moreover, exorbitant additional sacrifices of fuel economy will result from the changes necessary to satisfy 1976 regulations on the basis of current technology. One approach might be the adoption of the emission regulations established by the state of California. The California standards would reduce vehicle emissions to no more than 17% of the pre-controlled levels and would allow substantially greater fuel economy than the systems designed to meet the Federal standards. Future benefits must be carefully weighed against the many costs required to implement further emission reductions.

1972

38754

APTIC NO. 60731

Ministry of Labor, Health, and Welfare of North Rhine-Westphalia (West Germany)

OTHER EMISSIONS BY TRADE. (Sonstige Emissionen des Kleingewerbes). Text in German. In: *Reine Luft fuer morgen. Utopie oder Wirklichkeit? Ein Konzept fuer das Nordrhein-Westfalen bis 1980.* p. 72-74, 1972.

Existing and planned regulations concerning the limitation of specific emissions from trade and small-scale industry are reviewed. The solvent emissions from dry-cleaning shops are limited to 200 mg/N cu m, which can be achieved by the use of activated carbon filters. Emission control equipment is required for asphalt processing plants and for drying equipment used for the drying of surface-coated materials. Regulations concerning the emissions from zootechnical units, food processing plants, photogravure printing offices, and metal degreasing equipment are being planned.

1971

38755

APTIC NO. 60887

Favorite, Frank G., Lawrence M. Roslinski, and Ralph C. Wands

GUIDES FOR SHORT-TERM EXPOSURES OF THE PUBLIC TO AIR POLLUTANTS. National Academy of Sciences-National Research Council, Washington, D. C., Advisory Center on Toxicology, Aerospace Medical Research Laboratory Contract F33615-70-C-1046 and Air Pollution Control Office Contract CPA 70-57, Proj. 6302, AMRL-TR-71-120, Paper 16, 6p., Dec. 1971, 1 ref. (Presented at the Systemed Conference on Environmental Toxicology, Annual Meeting, 2nd, Fairborn, Ohio, 1971.)

NTIS, DDC: AD-751 438

Short Term Public Limits (STPL) and Public Emergency Limits (PEL) were defined for nitrogen dioxide, hydrogen chloride, and hydrogen fluoride. Nitrogen dioxide as a freely diffusible gas has the capacity to cause adverse health effects as a deep lung irritant at high concentrations (several hundred ppm for a few minutes) that might lead to pulmonary edema. Many variations in toxicity patterns occur with NO₂: toxicity is enhanced in the presence of ozone, sulfur dioxide, aldehydes, and a high density of respirable particles. The ambient temperature and the age of the exposed person also markedly influence individual response. The following short-term limits are recommended: STPL--10 min, 1 ppm, 30 min, 1 ppm, and 60 min, 1 ppm; PEL--10 min, 5 ppm, 30 min, 3 ppm, and 60 min, 2 ppm. Depending on the severity of exposure, the physiological responses to the inhalation of irritating levels of HCl are coughing, pain, inflammation, edema, and desquamation in the upper respiratory tract. If concentrations are high enough, acute irritation may bring about constriction of the larynx and bronchi, closure of the glottis, and breath holding. Fatal inhalation of HCl would be expected only when the victim is unable to escape from the contaminated atmosphere. The following limits are recommended: STPL--10 min, 4 ppm, 30 and 60 min, 2 ppm, and 5 hr/day, 3-4 days/mo, 0.67 ppm; PEL--10 min, 6.7 ppm, and 30 and 60 min, 3.4 ppm. The primary effect of acute exposure to gaseous HF in concentrations above a few ppm is irritation to the skin, eyes, and respiratory passages. Localized tissue damage may result on exposure to concentrations above recommended limits. At 12 ppm the mucosa are irritated, at 30 ppm for about 3 min the gas is detectable by taste, at 60 ppm the severity of irritation is noticeably increased, and at 120 ppm a stinging sensation of the skin is added, and the other irritations become so intense that man is unable to withstand the exposure for more than one min. The following limits are recommended: STPL--10, 30, and 60 min, 4 ppm, 5 hr/day, 3-4 days/mo, 1 ppm; PEL--10 min, 10 ppm, 30 and 60 min, 5 ppm.

38756

APTIC NO. 60964

National Academy of Sciences-National Research Council, Washington, D. C., Committee on Toxicology

BASIS FOR ESTABLISHING GUIDES FOR SHORT-TERM EXPOSURES OF THE PUBLIC TO AIR POLLUTANTS. Air Pollution Control Office Contract CPA 70-57, Rept. APTD-0684, 16p., May 1971.

NTIS: PB 199 904

Short-term exposures of the public to air pollutants are described in two categories; those which are predictable as to time and place of their occurrence, and those which are unpredictable. Limits for short-term exposures of either category should not be established for durations longer than 24 hr. Limits for both categories should always be subject to review as new data and new concepts are generated. The factors to be considered in setting limits for predictable and unpredictable short-term public exposures are discussed. These factors include the nature and extent of effects on humans, plants and animals, and materials. Other subjects discussed are nuisance effects, the availability of monitoring procedures, physical and

chemical characteristics of the pollutant, and the presence of other pollutants. The establishing of standards for short-term exposures of the public to atmospheric pollutants cannot be reduced to an arbitrary mathematical relationship. The process requires experienced judgement in evaluating pertinent information and selecting a balance of risks. The kinds of data required for setting limits for predictable and unpredictable exposures are identified. Interpretation of the data and the safety factors involved in applying the data to man are discussed. Short-term Public limits for predictable exposures and Public Emergency Limits for unpredictable exposures must be controlled to the point where their effect on the public health and welfare will be no greater than is acceptable under prevailing criteria and standards for ambient air quality. Nuisance effects such as unpleasant odors might be tolerated for the brief periods with which these Guides are concerned. Some of the judgmental considerations by a regulatory body for minimizing the potential overall risk to the public from short-term exposures are discussed. (Author summary)

1970

38757

APTIC NO. 60610

Heyndrickx, Ap. A.

ENVIRONMENTAL HYGIENE AND AIR, WATER AND SOIL POLLUTION. (Milieuhygiene en lucht-, water- en bodemverontreiniging). Text in Flemish. Meded. Vlaam. Chem. Ver., 32(6):195-202, Nov.-Dec. 1970. (Presented at a panel discussion on air pollution, Gent, Belgium, April 28, 1970.)

General problems of air, water, and soil pollution in Belgium are discussed. In matters of air pollution control, legislation with effective regulations concerning implementation is required, since the law enacted in 1964 has not been followed by adequate enacting clauses. The Provincial Commissions of East Flanders and Antwerp have determined the maximum allowable sulfur dioxide emission to be 5000 mg/cu m, while the maximum allowable ground-level concentrations for 24-hour periods and 30-minute periods are 280 micrograms/cu m and 400 micrograms/cu m, respectively. The yearly average concentration is limited to 150 micrograms/cu m. The maximum allowable dust concentration in sieving and milling operations is set at 150 mg/N cu m. The daily means of the settling dust, averaged from yearly and monthly measurements, are limited to 0.42 g/sq m and 0.65 g/sq m in nonindustrial areas, and to 0.85 g/sq m and 1.3 g/sq m in industrial areas. The maximum allowable dust concentrations are reduced for fine dust. If smoke and SO₂ are present in the air simultaneously, the limit values are reduced by 33%.

1968

38758

APTIC NO. 09883

California Air Resources Board, Los Angeles

CALIFORNIA EXHAUST EMISSION STANDARD AND TEST PROCEDURE FOR HEAVY TRUCKS. 21p., April 1968.

Definitions, standards or criteria, and certification requirements for heavy duty vehicles of more than 5000 lbs are listed for the State of California. A procedure is presented for determining the conformity of new motor vehicles with the applicable standards. The tests are applicable to vehicles equipped with catalytic or direct-flame afterburners, induction system modifications, other control systems or devices, or uncontrolled vehicles and engines. The test applies to all heavy duty vehicles which employ the spark ignition principle and operate on gasoline fuel. The basic exhaust emission test for heavy duty vehicles is designed to determine hydrocarbon and carbon monoxide concentrations during a simulated truck driving pattern in a metropolitan area.

214

LEGAL AND ADMINISTRATIVE

1974

38759

APTIC NO. 60984

Fischer, Reinhard

THE FEDERAL IMMISSION PROTECTION LAW. (Das Bundes-Immissionsschutzgesetz). Text in German. Metallwirtsch. Metallmarkt, 28(4):398-401, April 1974.

The immission protection law of the Federal Republic of Germany has been approved by Parliament and will soon go into effect. The most important sections of the law are reviewed. The law is divided into seven parts with 74 paragraphs. Part one explains the purpose and scope of the law and defines terms. Part two addresses itself to the equipment and the operation of plants and describes licensing procedures. The determination of emissions and immissions is discussed and the annual declaration of emissions by plant operators is demanded. Part three deals with the composition of substances and products and the design of equipment which must comply with the demands for environmental protection. Part four grants the right to the federal government to control the design and operation of street-bound and rail-bound vehicles by regulations to avoid, as far as possible, environmental pollution. Part five is concerned with the monitoring of air pollutants and with the information immission inventories have to provide. They must contain data concerning type, quantity, spatial and temporal distribution, and exit conditions of air pollutants for which the emission declarations by plant operators as demanded by part two are used. Part six deals with the right of the government to pass regulations concerning allowable maximum immission and emission concentrations, and with methods determining emissions and immissions. Part seven deals with transitional regulations. Individual paragraphs of the law are discussed in greater detail.

38760

APTIC NO. 61397

Fritsch, Hans W.

ENVIRONMENTAL PROTECTION AND FIRING TECHNOLOGY. (Umweltschutz und Feuerungstechnik). Text in German. Oel Gasfeuerung, 19(4):286-288, 1974. 5 refs.

The Federal Immission Protection Law and the new Technical Directives for the Maintenance of Clean Air will require extensive reductions of emissions from firing systems. The oxides of nitrogen emission will be limited to 450 mg/cu m. The emission of these pollutants is strongly influenced by the burner construction, the size of the combustion chamber, the geometry, and the wall temperature. This means that new developments will be required to meet this demand. The sulfur dioxide emission will be limited for stacks with less than 30 m to less than 0.5%. For plants with a capacity of more than 40 GJ/hr a sulfur concentration in the fuel of 1% at the most will be allowed. Entirely new is the limitation of formaldehyde to 20 mg/cu m or 15 ppm.

38761

APTIC NO. 60365

High, M. Dean

A REVIEW OF THE BACKGROUND, PREPARATION AND USE OF ENVIRONMENTAL IMPACT STATEMENTS. J. Air Pollution Control Assoc., 24(2):111-114, Feb. 1974. 6 refs. (Presented at the Air Pollution Control Association, West Coast Section Technical Meeting, Las Vegas, Nev., Oct. 3, 1973.)

A review of the background, preparation, and use of environmental impact statements is presented along with some court cases which have made significant findings about major issues. The major difficulties involved in preparation of impact statements include: the lack of fundamental knowledge about the environmental and ecological systems, the weakness in assessment techniques, the inability to identify and evaluate second-

dary and tertiary effects of proposed actions, the inability to quantify amenity values for comparison with economic benefits and costs, and the lack of clear cut governmental agency guidelines and regulations regarding environmental impact statements. Courts have considered that at the very least the National Environmental Policy Act is an environmental full disclosure law; additionally, they have found that it was intended to effect substantive changes in decision making. The environmental impact statement must therefore contain, at the minimum, information which will put the public on notice to all known possible environmental consequences.

38762

APTIC NO. 61531

Inoue, Ichiro

REGULATION OF TOTAL AMOUNT OF EMISSION FOR MAINTENANCE OF ENVIRONMENT. (Taiki hozen ni okeru soryo kisei donyu eno kadai). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(2):10-14, Feb. 1974.

Emission standards of sulfur oxides are determined by the equation, q equals K times sq He/1000, where q is the amount of SO_x (Ncu m/h) emitted, K is the constant determined for each different district, and He the effective height of chimney. This is the so called K value regulation determined with the diffusion theory. Values of K have been changed from 20.4 to 29.2 in 1968 and from 2.92 to 22.2 at the present. However, this K value regulation has several unreasonable tenets. For example, the allowable emissions increase with an increase of chimney height, scattering SO_x over a broader area. Moreover, this law regulates amount of SO_x from one chimney only, and an increase of stacks in each district results in an increase of SO_x . The government has revised the K value several times; however, they have failed to respond to lowering of environmental conditions by this law. The introduction of regulation of total emission is necessary from this point. The total amount of emissions must be below the capacity of the district to clean up easily. This amount must be divided among the factories in the district. An example to estimate the environmental capacity carried out in Mizushima district is shown in the text, together with several examples of regulations for total amount of emission made by several local governments.

38763

APTIC NO. 60390

Morgan, G. B., W. E. Bretthauer, and S. H. Melfi

GLOBAL POLLUTION MONITORING. Instrum. Technol., 21(2):27-31, Feb. 1974. 5 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D. C., 1973.)

Global pollution monitoring is reviewed in terms of systems being used, analytical procedures, representative data, and the overall philosophy of setting up a monitoring network. Considerations which should be taken into account when establishing priorities for selection of pollutants are: effects of a specific pollutant on weather or long term climate modification; severity of adverse effects on the population; persistence of the agent in the environment, resistance to degradation, and accumulation in man or in the food chain; conversion in the environment to substances that may be more toxic than the parent compound; ubiquity and abundance in the environment; size and type of population exposed, frequency, and magnitude of exposure; and feasibility of measurement in the various media. Priority pollutants for a global monitoring system are listed in terms of their media (air, oceans, biological, precipitation) and methods adequate for their detection. Global background concentrations, major sources, and concentrations are also listed for several pollutants. Each background monitoring station should quantify concentrations of: suspended particulates; gases such as carbon monoxide, carbon dioxide, sulfur dioxide, nitrogen dioxide, and ozone; precipitation and its acidity; solar radiation; and other meteorological data. The station will cost in the neighborhood of \$250,000.

38764

APTIC NO. 61083

Otsu, Yukio

LAWS AND REGULATIONS RELATED TO AIR POLLUTION. (Taiki osen kankei horei). Text in Japanese. PPM (Japan), 5(5):23-38, May 1974.

The topics of discussion include: the basic law concerning pollution control; the definition of public nuisance; environmental standards; responsibilities of industries, government, the local public authorities; factories subject to special control laws and the content of regulations; the air pollution control law; emission standards; fuel consumption regulations; emergency measures; monitoring of smokes; installation registration procedures, penalties, and no-fault damage compensation. The tables include pollutants, measurement methods, environmental standards, pollution control plans for various regions and areas special control factories personnel qualifications, past regulations concerning air pollution control, control methods, soot and dust emission facilities, their structures, regulations, usages, and management standards; sulfur oxides emission standards for various regions, special emission standards, toxic substance emission standards, nitrogen oxides emission standards, atmospheric conditions for emergency warnings, and soot and smoke measurement methods.

38765

APTIC NO. 61312

Puetz, Manfred and K. -H. Buchholz

EXPERIENCES IN DORTMUND WITH A MOBILE EMISSION MEASURING STATION. (Dortmunder Erfahrungen mit dem Emissions-Messwagen). Text in German. Umschau Wiss. Tech., 74(9):282-283, 1974. 1 ref.

In mid-1972, the Staatliches Gewerbeaufsichtsamt in Dortmund organized a mobile patrol responsible for performing emission monitoring and measurement tasks in the area of the agency's jurisdiction, both ex officio and because of public complaints. Its main task is checking industrial plants which emit the maximum permissible level of pollution. Both the number of complaints and the number of violations of emission limits have now decreased. This is due to the fact that the owners of the plants are more conscious of environmental protection since learning of the existence of the testing service.

38766

APTIC NO. 60378

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. Federal Register, 39(26):4662-4663, Feb. 6, 1974.

Section 3(a) (1) of the State of Indiana regulation APC-19 which was submitted as a revision to the State Implementation Plan has been disapproved by the Environmental Protection Agency Administrator on the grounds that it permits the granting of provisional permits beyond the statutory attainment dates without the approval of the Administrator. A Federal regulation specifying the procedures and circumstances under which Indiana will be authorized to issue provisional permits to sources subject to provisions of its implementation plan is currently being promulgated. Regulation APC-19 also establishes a review procedure for new or modified sources and meets the statutory and regulatory requirements of the Clean Air Act to provide a review procedure to prevent construction or modification of sources which would interfere with attainment and maintenance of national air standards with two exceptions. The first exception is Section 4(a) (2) (iii) which exempts fuel burning equipment having a heat input of less than 1,500,000 Btu/hr from permit requirements, and the second exception relates to requirements for review of indirect sources as promulgated by the Administrator on June 18, 1973. That part of the currently effective Federal regulation for review of new or modified sources which pertains to local burning equipment over 350,000 Btu/hr shall be retained, but a cut-off point of 1,500,000 Btu/hr shall be inserted to avoid duplication of state reviews. The disapproval notice pertaining to new indirect source review procedures remains unaffected by the present notice.

38767

APTIC NO. 66394

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. APPROVAL OF PLAN REVISIONS; TENNESSEE. Federal Register, 39(50): 9667-9668, March 13, 1974.

Chattanooga-Hamilton and Nashville-Davidson County revisions to the Tennessee plan to attain and maintain the national ambient air quality standards have been approved by the Environmental Protection Agency Administrator effective March 13, 1974. Significant changes for Chattanooga-Hamilton County include: the addition of emission limiting regulations for the control of nitrogen oxides; more stringent emission limiting regulations for the control of particulate matter from incinerators, process sources, and fuel burning equipment; deletion of regulations for control of sulfur oxide concentrations at ground level, with fixed limits on stack emissions of sulfur dioxide remaining unchanged; and the addition of regulations which require sources to monitor and report emissions and which provide for the release of emissions data to the public. Nashville-Davidson County revisions include: clarification of administrative procedures, of ambient and source testing methods, and of some terms and definitions; revision of regulations dealing with visible emissions, open burning, particulate emissions from fuel combustion and industrial processes, fugitive dust, and incinerators; and addition of regulations requiring sources to monitor and report emission data which provide for emission data release to the public and which provide for pre-construction review of proposed new facilities to assure attainment and maintenance of the national ambient air quality standards.

38768

APTIC NO. 60997

Quarles, John

MAINE. PROPOSED REVISION CONCERNING OPEN BURNING. Federal Register, 39(23):4116, Feb. 1, 1974.

A notice has been issued by the Environmental Protection Agency Administrator setting forth a revision to the Maine implementation plan which postpones the date for cessation of open burning from July 1, 1974 to July 1, 1975. The revision also sets forth a schedule for compliance which includes status reports from towns currently open burning, a status report indicating that necessary studies and preparation of final plans are progressing, final plans for alternate disposal of solid waste, copies of executed contracts or agreements necessary to implement the approved final plans, and certification of compliance. The public is advised that comments may be submitted addressing approval/disapproval of the revision as required by section 110 of the Clean Air Act.

38769

APTIC NO. 60998

Quarles, John

APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. APPROVAL OF REVISIONS. Federal Register, 39(23):4082, Feb. 1, 1974.

Effective February 1, 1974, the Environmental Protection Agency has approved as part of the South Carolina State Implementation Plan revisions submitted by the State on August 16, 1973; compliance schedules as promulgated on August 23, 1973 have been concurrently revoked. The revisions included a schedule regulation requiring achievement of periodic increments of progress and a new regulation dealing with hazardous conditions which would require owners or operators of any source to take necessary steps to protect human health and welfare and to make proper notification when hazardous materials have been released. The proposed revisions were determined by the Administrator to be consistent with the attainment of national ambient air quality standards in South Carolina.

216

38770

APTIC NO. 60999

Quarles, John

CONTROL OF AIR POLLUTION. EXCLUSION AND EXEMPTION OF MOTOR VEHICLES AND MOTOR VEHICLE ENGINES. Federal Register, 39(56): 10601-10603, March 21, 1974.

The Environmental Protection Agency is considering the addition of a new Subpart R to Part 85 of Title 40 of the Code of Federal Regulations for the exclusion and exemption of motor vehicles and motor vehicle engines under the Clean Air Act. The proposed regulations embody a series of guiding criteria whereby the applicability of the Act to most vehicles can be easily determined. Examples of vehicles excluded include those which cannot maintain a cruising speed of 20 mph over level, paved surfaces, vehicles which lack features customarily associated with safe and practical highway use, and vehicles which exhibit features which render their use on the street or highway unsafe, impractical, or highly unlikely. The proposed regulations define the substantive scope of each exemption provision of the Act and establish a procedure whereby exemptions can be requested.

38771

APTIC NO. 61590

Quarles, John

STATE OF WASHINGTON PROPOSED COMPLIANCE SCHEDULES FOR AIR QUALITY PLAN. Federal Register, 39(69):12872, April 9, 1974.

The proposed compliance schedules for the air quality plan of 16 companies in the state of Washington are announced. Public comment is invited on whether the compliance schedules revisions to the State plan should be approved.

38772

APTIC NO. 61548

Rueden, H.

MINIMUM REQUIREMENTS OF HYGIENE IN MODERN SCHOOL BUILDINGS. (Hygienische Mindestanforderungen im modernen Schulbau). Text in German. *Oeffentl. Gesundheitswesen* (Stuttgart), 36(3):17-179, 1974. 20 refs. (Presented at the Schulfachlichen Dezentralen der Schulaufsichtsbehoerden auf Schloss Reisenburg, Guenzburg/Donau, Sept. 2, 1973.)

The site selection for new schools, the location of the windows, the ventilation, heating, illumination, and noise protection of school buildings is discussed. Through measurements of air pollution it should be determined that the emission and immissions in the vicinity of a future school building are low. This is important since in the Federal Republic of Germany the concentrations of sulfur dioxide, carbon dioxide, fine dust, and aerosols frequently exceed the tolerance limits. As a solution to this, the school should be moved to less polluted peripheral areas. Air conditioning systems provide no cleaner air than the atmospheric air. At a relatively high atmospheric pollutant concentration almost the same high concentration can be expected indoors.

38773

APTIC NO. 60360

Sataka, T., K. Ryuge, M. Hara, Y. Ishikawa, H. Ishikawa, K. Kasama, T. Nomura, and K. Takagi

DISCUSSION ON THE PROBLEMS ON THE DIAGNOSIS AND THE OFFICIAL RECOGNITION OF RESPIRATORY DISEASES. (Kogai-sei kokyuki shikkan no shindan to nintai ni okeru mondaiten ni taisuru kento). Text in Japanese. *Nippon Kyobu Rinsho* (Japan. J. Chest Diseases), 33(1):25-33, Jan. 1974. 20 refs.

Chronic bronchitis, bronchial asthma, pulmonary emphysema, and asthmatic bronchitis have been designated by the Japanese government as air pollution associated diseases and government relief for the treatment of these diseases is offered in officially appointed regions. The diagnostic definitions of these conditions, made 10 yr ago, should be updated. The definitions

of Fletcher should be adopted for designating a disease as chronic. The definition of the American Thoracic Society should be adopted for bronchial asthma. The diagnostic criteria of the World Health Organization (1962) should be adopted for pulmonary emphysema. The problems of defining chronic bronchitis, chronic pulmonary emphysema, and other respiratory diseases are also discussed.

38774

APTIC NO. 61511

Shidara, Masao

AIR POLLUTION CONTROL IN THE FUTURE.

(Taikiosen taisaku no miraizo). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 10(1):1294-1303, Jan. 1974.

Environmental standards for sulfur oxides, carbon monoxide, suspended particulates, oxidants, nitrogen oxides, noise, water pollution, and engine exhausts are discussed. Japanese air quality standards for SO_x are 0.1 ppm for the 1-hour value and 0.04 ppm for the 1-day average. Standards for NO_x are 0.02 ppm for the 1-day average. Emission standards are being constantly revised downwards using the K value method of determination. The equation $K \times \text{He}/1000 \text{ N cu m/h}$, where K is a constant used for each district and He is the effective height of the chimney, gives a calculation of the appropriate emission standard for that district. To reduce NO_x emissions, fuel oil desulfurization by cracking and gasification, and modifications or firing methods are possible.

38775

APTIC NO. 60436

Utsunomiya, Makoto

REVISION OF AIR POLLUTION CONTROL LAWS.

(Taiki osen boshiho no kaisei). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(5):32-37, May 1974.

The content of the total emission standards as defined by the revised air pollution control law, the regulations of the national government and of local authorities, maximum allowable emission quantities and environmental standards, the total quantity reduction plans, improvement orders and penalties, registration methods, and future problems are discussed. The main points in the recent revision of the air pollution control law total emission quantity standard are as follows: areas and substances subjects to the standards are designated by the government ordinances; as to individual areas, prefectural governors will determine the total emission standards for factories and plants larger than a given size; the governor will determine the fuel consumption standards with regards to sulfur oxides emission of small plants and workshops with smoke emission sources; the governors will prepare plans for reducing the area's total emission and report to the head of the Japan Environmental Agency; it is within the power of the governor to issue an improvement order to plants and factories which do not adhere to the regulation emission standards.

38776

APTIC NO. 60441

PARTIAL REVISION OF AIR POLLUTION CONTROL LAW. (Taiki osen boshiho ichibu kaisei ni tsuite). Text in Japanese. Kankyocho Kogaisenmon Shiryō (Public Nuisance Gaz), 9(2):84-88, March 1974.

With regard to the revision of the air pollution control law, dated January 29, 1974, the main points of revision, the necessity of total emission standards, and basic methods of total emission calculation are discussed. The local public entities which have already enforced the total emission regulations are presented in a table, with the methods of emission allowance calculations. The total emission standards mentioned here include the method of establishing an emission standard for each plant as a unit, in order to abate the total emission quantity of a given area, taking the areas characteristic weather, source locations, and other factors into consideration. The regulations are applicable to fixed sources, and other mobile sources will be subject to other considerations. By this method, the maximum

allowable emission quantity is calculated by point sources in order to keep the area's total environmental concentration under a given level. These figures will be obtained by highly accurate and precise calculations, and even when new emission sources are built, the total emission quantity of the area should not increase. The construction of high stacks will not be an answer in this case, but the reduction of emission at each source will be necessary. Since the emission quantity is determined by plant as a unit, the plant will have a wide selection of methods for keeping the total emission down, and an effective pollution control is possible.

38777

APTIC NO. 60442

THE STATE OF REGULATIONS CONCERNING TOTAL EMISSIONS ON THE REGIONAL LEVEL. (Chiho ni okeru soryo kisei no jittai). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(5):38-46, May 1974.

Generally, the total emission standard for an area is the absolute total quantity of pollutants emitted by the entire factory or the entire area. But in Kanagawa, Niigata, Kyoto, and Mie prefectures, emission standards are designated based on the total allowable emission standard from each factory. Another method of determining the total emission standard is to allot the maximum allowable emission standard to each industrial complex, based on the calculation on the environmental standard for the area. Osaka and Mie prefectures and Kawasaki city calculated the atmospheric capacity using dispersion models, and arrived at the necessary reduction rate for emission for each unit area. A computer simulation of dispersion models shows the relationship between pollutants from various emission sources and the environmental concentration, and the necessary reduction rate is calculated. In Chiba prefecture, a new plan for SO_x reduction was enforced in July 1972. This requires the measurement at each monitoring point to be less than 0.003 ppm (maximum ground concentration). This required the total reduction of 65% in the sulfur content in the total emission. As to the NO_x standard, the emission standard will be reduced by 20% over and above the national standard, when the national standard for NO_x total emission is set. Osaka prefecture has a big plan of a general environmental protection system involving a budget of approximately \$12.5 billion, with the target date of 1981.

1973

38778

APTIC NO. 60996

Bultynck, H. C.

THE CONCEPT AND ORGANIZATION OF AUTOMATIC MONITORING NETWORKS AS A FUNCTION OF THEIR PURPOSE. (La conception et l'organisation de réseaux automatiques en fonction de leurs objectifs). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 26(361):504-509, Dec. 1973.

The functions and the typical organization of national air quality monitoring networks are described. Automatic networks can be used for data gathering, calibration of instruments, data storage, permanent supervision of a given region regarding air pollution for warning in emergency situations. Regional networks should be integrated within national networks. A typical national network is composed of remote terminal units, regional data reduction centers, and a national data processing center. The remote terminal units, whose operation is controlled by the regional data reduction center via telephone lines, measure sulfur dioxide, nitric oxide, nitrogen concentrations, and some of the terminal units are even equipped for the measurement of such meteorological parameters as wind speed, wind direction, and temperature gradient. Operational control of network telecommands, validation techniques with error outputs, 30-min outputs, alarm procedures for industry and local authorities, visual display, analog recording, and 48-hour storage are the basic functions

of regional data reduction centers. The national data processing center is responsible for the final storage of the reduced measurement data, for the distribution of vital data to national health and meteorological institutions.

38779

APTIC NO. 58746

Chew, Marian F.

APPLICATION OF AIR POLLUTANT DAMAGE FUNCTIONS TO AUTO SMOG CONTROL. Preprint, Society of Automotive Engineers, New York, 17p., 1973. 26 refs. (Presented at the Society of Automotive Engineers International Automotive Engineering Congress, Detroit, Mich., Jan. 8-12, 1973.)

Air pollutant damages were calculated for six major pollutants. Damage functions were drawn for auto exhaust carbon monoxide, hydrocarbons, oxidants, particulates, nitrogen oxides, and sulfur oxides. Damages to human health, plants, animals, materials, and aesthetics were quantified for each pollutant. Costs of control of auto exhaust CO, HC, and NOx were calculated for 1966-1977. Using the air pollutant damage functions, benefits (reductions in damages) of controlling auto exhaust were compared with costs of control to identify candidates for an air pollution control strategy. Using the air pollutant damage functions, the change in benefits was compared with change in cost of control of auto exhaust to determine optimum level of the control measure. An air pollution control strategy that utilizes damage functions gives the greatest difference between benefits and costs.

38780

APTIC NO. 60742

Ducker, R. L. and P. A. Mullen

AIR POLLUTION TRAINING INSTITUTE CURRICULUM DESCRIPTION AND RECOMMENDATIONS. VOLUME II. CURRICULUM RECOMMENDATIONS. FINAL REPORT. Applied Science Associates, Inc., Valencia, Pa., Environmental Protection Agency Contract 68-02-0608, Rept. APTD-1553, 219p., April 20, 1973. 5 refs.

The development of recommendations for modifying the Air Pollution Training Institute curriculum to better meet the air pollution-training needs of the public and private sectors is described in the second of two volumes reporting a study performed for the Manpower Development Staff (Planning and Special Projects Section) of the Environmental Protection Agency. General recommendations are given for the following areas: training philosophy and methods, course development, student evaluation, documentation, student population specification, and prerequisites and pretests. Course-specific recommendations are made for the Surveillance and Laboratory Section, the Engineering and Enforcement Section, and the Air Quality Management Section.

38781

APTIC NO. 60959

Jaatinen, S.

LEGISLATION ON ENVIRONMENTAL PROTECTION IN SCANDINAVIA. European Liaison Committee for Cellulose and Paper, Proc. EUCEPA Conf., 15th, Harmonizing Pulp Paper Ind. Environ., Rome, 1973, p. 73-86, 109-112. (May 7-11.)

Legislation on environmental protection in Scandinavia is summarized. There is no uniform environmental protection law in Finland. The existing legislation is partly obsolete and there is still no law covering some of the newer areas of environmental protection. The Building Act of 1958 and the Building Statute of 1959 incorporate regulations that pertain to the sphere of air protection. The Work Safety Act of 1958 protect workers against dust, smoke, and gases. The most important practical regulations are the Public Health Act of 1965 and Public Health Statute of 1967. The Motor Vehicle Statute of 1957 regulates the direction of exhaust gases from automobiles and motor cycles. The supreme authority is the National Board of Health. A significant legislative reform in Sweden in 1969 was

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the Environmental Protection Act and Environmental Protection Statute which forbids the use of land or a building in such a way as to cause air pollution. Denmark has no regulations common to air protection. The most important regulations are contained in the public health by-laws of individual communes. Practically all public health by-laws decree that factories may not constitute a health hazard through noxious gases, smoke, dust, stench, or similar reasons. In Norway, the Neighbors Act of 1961 requires permission from the Environmental Protection Ministry to conduct activities which may cause harm because of the spread of gas, smoke, irradiation, or similar reasons.

38782

APTIC NO. 61126

Junge, Chr.

REGIONAL AND GLOBAL AIR POLLUTION - PROBLEMS AND ASPECTS OF ITS MONITORING. (Regionale und globale Luftverschmutzung - Probleme und Gesichtspunkte ihrer Ueberwachung). Text in German. In: Repraesentanz luftchemischer Messungen an Background-Stationen. Kommission zur Erforschung der Luftverunreinigung, Mitteilung VII, p. 9-20, 1973. 5 refs.

Regional or global air pollution monitoring grids pursue long-term, large-scale changes in the composition of the atmosphere. To obtain a realistic picture of the extent of atmospheric pollution, the background concentration must be known. The problems of properly positioning stations measuring background concentrations are outlined. The results of a measurement grid for the SO₂ background concentration set up in 1950 over Northern and Western Europe shows maxima over the densely populated and industrialized areas of England, northern France, and West Germany. All of west and central Europe has higher concentrations than Scandinavia. Chemical conversion and fallout are increasingly important for regional and global dispersion. The dwelling time of a pollutant in the atmosphere may fluctuate over a wide range. Sulfur dioxide and aerosols have residence times of several days to 3 weeks. Carbon dioxide has an average dwelling time of 6 years. This is important for the number of stations required which will be much lower for measuring the CO₂ concentration than for the much shorter-lived SO₂ or for aerosols. Plans for global measurement grids include 10 stations for CO₂ and 100 for SO₂.

38783

APTIC NO. 60989

Mach-Weber, Gerda

LEGAL PROBLEMS OF ENVIRONMENTAL PROTECTION IN RAW MATERIAL EXTRACTION AND PROCESSING. (Rechtliche Probleme des Umweltschutzes bei der Rohstoffgewinnung und Verarbeitung). Text in German. Berg Huettenmaenn. Montash., 118(6):176-180, June 1973.

Legal problems of environmental protection in raw materials extraction and processing are discussed on the basis of existing and planned legal regulations concerning industrial facilities and mines in Austria. Owners of properties and estates, and so also of mines, are required to prevent nuisances to their neighbors due to waste waters, smoke, gases, heat, odors, and vibrations that exceed the locally usual extent (background). Industrial facilities require approval by the authorities before being put into operation, while the authorities are also entitled to prohibit operation even of approved facilities if and when they generate nuisances and environmental hazards. Health hazards and impairment are regarded as the only criteria of nuisances, rather than actual emissions and pollutant concentrations. The authorization of mining operations will be preceded by public hearings.

38784

APTIC NO. 60873

Mandl, V.

THE ACTION OF THE COMMISSION OF THE EUROPEAN COMMUNITY IN ENVIRONMENTAL PRO-

TECTION AREA. (L'azione della Commissione delle Comunità Europee per la protezione ambientale). Text in Italian. Associazione Tecnica Italiana per la Cellulosa e la Carta and Food and Agriculture Organization (Italy) Proc. EUCIPA Conf. 15th, Harmonizing Pulp Paper Ind. Environ., Rome Italy, 1973, p. 43-50, 109-112. (May 7-11.)

The action of the Commission of the European Communities in environmental protection and in the improvement of the quality of life and environment is surveyed. Highest possible degree of reduction and prevention of environmental pollution and environmental nuisances, conservation of natural resources, and space planning in view to minimize the harmful effects of urbanization and industrialization are the basic principles of the approach to environmental problems. Environmental pollution should be avoided or prevented rather than abated when already existing, and therefore, adequate technological measures should be taken in the planning stage in industrial projects. Distortions in the market situation and in competition, brought about by environmental protection measures, should be eliminated within the framework of the Common Market. Determination of scientific criteria of the toxicity of principal air pollutants, the elaboration of uniform methods for the definition of the required quality of the environment, and the organization and buildup of regional and national pollution monitoring networks will be needed. An environmental program recently adopted by the Commission of the European Communities for the pulp and paper industry as well as for the metallurgical industry envisages preliminary studies on the nature of the pollution problems to be solved, a study of the technologies available or under development, and a comparative and critical study of the pollution control measures adopted by the member countries. In a second phase of this program, similar studies will be performed in the chemical, food, textile, and other industries.

38785

APTIC No. 60763

Moss, Angela

SMOKE CONTROL - A STOCKTAKING OF THE PRESENT POSITION. Preprint, National Society for Clean Air, Brighton (England), 20p., 1973. 4 refs. (Presented at the National Society for Clean Air, Annual Conference, 40th, Torquay, England, Oct. 15-19, 1973.)

Smoke control in England is reviewed in terms of percentages of total black areas covered by orders from local authorities, areas that have not submitted smoke control programs, the geographical distribution of urban and industrial black areas, completed programs, comparisons in smoke control progress between different areas of the same size, the slow progress in smoke control in the Northern Region, local government reorganization, trends in proceeding with smoke control programs, and cost-benefit considerations. Figures cited for London indicate that smoke concentrations have decreased by 80% and sulfur dioxide concentrations by 40% since 1958.

38786

APTIC No. 61380

Otsu, Yukio

ON THE MEASURE FOR EMISSION CONTROL OF HYDROCARBON, (ESPECIALLY ORGANIC SOLVENTS). (Tankaisuo (tokuni ukiyozai) no haishutsu yokusei taisaku ni tsuite). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 26:83-88, Nov. 1973.

Of the total hydrocarbons in the air of the Tokyo Bay area 27% come from organic solvents. No regulations currently exist for the control of organic solvents, but regulations for 1973 will be discussed by the Inter-Agency Conference for Promoting the Control of Photochemical Smog. Los Angeles County regulations (Rule 66) and San Francisco Bay Area Air Pollution Control District regulations (Regulation 3) will be used as models. Rule 66 deals with saturated halogenated hydrocarbons, perchloroethylene, olefins, cyclic olefins, alcohols, aldehydes, esters, ketones, aromatic hydrocar-

bons with more than 8 carbon atoms, ethylbenzene, trichloroethylene, and toluene.

38787

APTIC No. 58445

Quarles, John

VERMONT IMPLEMENTATION PLAN. NOTICE OF PROPOSED REVISION. NEVADA. APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. Federal Register, 38(239):34330, Dec. 13, 1973.

The notice of the proposed revision of the Vermont implementation plan and the approval and promulgation of the Nevada implementation plans are presented. The Vermont legislature has amended the State's statutes to transfer the regulatory and administrative authority for air pollution control from the Vermont Board of Health to the Secretary of the Agency for Environmental Conservation. The omitted tables of the Nevada compliance schedules are included, and the period for public comment is extended.

38788

APTIC No. 61309

Quarles, John

NEW JERSEY TRANSPORTATION CONTROL PLANS. Federal Register, 38(218):31388-31400, Nov. 13, 1973.

A notice of rule-making sets forth a transportation control plan for the New Jersey portions of the New Jersey-New York-Connecticut interstate and Metropolitan Philadelphia interstate air quality control regions. Should New Jersey submit by the end of 1973 a plan that is considered approvable in whole or in part, the Federal plan set forth herein will be rescinded or modified. The background to the proposed plan is discussed, along with its air quality basis, the selection of strategies, the need for mass transit, and the economic impact of the plan. The EPA plan is described.

38789

APTIC No. 61308

Sansom, Robert L.

REQUIRED DATA: CORRECTION. Federal Register, 38(225):32257-32258, Nov. 23, 1973.

In the Required Data section of the motor vehicle regulations published on November 10, 1970, manufacturers were required to describe tests performed to ascertain compliance with general standards in the section pertaining to general standards for increased emissions and unsafe conditions and the data derived from such tests. When the regulations were recodified and published on November 15, 1972, the section number on this section was incorrectly changed to reference the particular model year emission standards. The error was repeated throughout the publication for the various classes of light duty vehicles and heavy duty engines and was repeated in the June 28, 1973 republication of the motor vehicle regulations and in the August 7, 1973 publication of the light duty diesel vehicle and light duty truck regulations. These errors are herein corrected.

38790

APTIC No. 61435

Schuermann, Heinz Juergen

THE POLITICAL DIMENSIONS OF THE ENVIRONMENTAL PROBLEM FROM THE ECONOMICAL POINT OF VIEW. (Die politischen Dimensionen des Umwelt-problems aus oekonomischer Sicht). Text in German. Erdoel Kohle-Erdgas-Petrochem., 26(12):718-722, Dec. 1973. 17 refs.

A hardly discussed economical political solution to the environmental pollution problem seems to be the license strategy. It guarantees both the qualitative goals of the growth policy as well as the target of economic efficiency. In simplified terms the license strategy is as follows. Based on the environmental pollution which is tolerated in the various ecological systems, a corresponding number of licenses for the use of the environment are granted. The licenses are specified according

to type and quantity. The licenses are offered by the government and are traded on special exchanges. Corresponding to the respective supply and demand, a price for the licenses is formed. For example if a pollution by sulfur dioxide of 160 t/sq km/yr is tolerated, 8000, 80,000, or 800,000 licenses can be issued which are offered for auction. Those polluters for which it is cheaper to switch to less polluting processes are eliminated. The licenses will be acquired only by those for which any switch is more expensive than acquiring a license.

38791

APTIC NO. 58446

Train, Russell E.

REVISION TO IMPLEMENTATION PLAN. Federal Register, 38(240):34476-34479, Dec. 14, 1973.

Revisions of implementation plans are presented for New Hampshire, Alabama, and Tennessee, and proposed plan revisions for review of indirect sources are included for Idaho and Washington. The proposed New Hampshire revision would exempt two seasonal tourist attraction railways from the regulation on the control of visible and particulate emissions from fuel-burning equipment. Alabama proposed to delete from its air pollution control regulation the portion on sulfur oxide emissions from fuel combustion of the basis of a new County classification system. Tennessee proposed to delete from its air pollution control regulations the portions which deal with sulfur oxide emissions and sulfuric acid plants due to a new classification system.

38792

APTIC NO. 61504

Urashima, Masatoshi

GENERAL ADVANCE SURVEY OF INDUSTRIAL PUBLIC NUISANCES. (Sangyo kogai sogo jizen chosa). Text in Japanese. Tausanaho Koho (Gaz. Minist. of Int. Trade Ind.), no. 7228:13-22, Dec. 21, 1973.

A general advance survey has been conducted by the Ministry of International Trade and Industry since 1965 in order to predict industrial public nuisances that may be caused by a particular industrial zone that is expanding or being newly installed and to recommend preventive measures. The survey consists mainly of air and water pollution investigations. All the factories operating in a selected area are assessed as a group for pollution. Using wind tunnel experiments and computers, scientific prediction of possible air and water pollution is made for a particular area. Based on the findings obtained from the survey, factories are provided with administrative guides by the Ministry which has reviewed their installations or expansion plans. The air and water pollution prediction methods used in this survey are discussed in detail. They include investigation of atmospheric diffusion factors, wind tunnel experiments, and theoretical calculation using established diffusion formulas. In connection with all this, new legislation entitled the Factory Location Law was promulgated on Oct. 1, 1973. It controls installation of new plants and requires advance submission of the construction plans and other related plans. The requirements of the new law are explained article by article.

38793

APTIC NO. 60628

Centre Interprofessionnel Technique d'Etude de la Pollution Atmosphérique, Paris (France)

THE FRENCH LEGISLATION CONCERNING THE PREVENTION OF AIR POLLUTION FROM FIXED SOURCES. (La législation française relative à la prévention de la pollution atmosphérique par les sources fixes). Text in French. C.I.T.E.P.A. Etudes Documentaires Rept. 41, CI 779, 75p., 1973.

French legislation concerning the prevention and abatement of air pollution from fixed sources, and acts and regulations issued in 1810, 1917, 1932, 1961, 1964, and 1967 are reviewed. The sulfur dioxide concentration must not exceed 0.250 mg/cu m. The normal admissible values for rural, moderately ur-

AIR POLLUTION ABSTRACTS, AUGUST 1974

banized, and urban areas are 0.010 mg/cu m; 0.110 mg/cu m, and 0.160 mg/cu m, all being 24-hour averages. The dust concentrations in emissions from different types of industries, such as cement works, ore dressing plants, foundries, waste incinerators, and oxygen converters are limited to 150 mg/cu m. The 1964 Act called for the creation of special protection zones in urban areas where fuels with reduced sulfur content are required, and for systematic inspection of combustion equipment with capacities in excess of a certain limit value. Financial and special tax incentives have been granted industries investing in pollution control equipment.

38794

APTIC NO. 60752

International Business Machines Corp., Gaithersburg, Md., Federal Systems Div.

COMPREHENSIVE DATA HANDLING SYSTEM (CDHS). EMISSIONS INVENTORY SUBSYSTEM USERS GUIDE. (FINAL REPORT). Office of Air and Water Programs Contract 68-02-0638, Rept. APTD-1550, 200p., July 1973.

NTIS: PB 230929/AS

An instructional manual is provided for using the Emission Inventory Subsystem (EIS) of the Comprehensive Data Handling System (CDHS). The subsystem provides a systematic method for collecting large volumes of data in a data base that will provide a central source for the information needed to help control air pollution. Topics covered in the manual include: an overview of the Emission Inventory Subsystem, file maintenance and retrieval, output programs, data conversion programs, emission factors table programs, and system operation. An appendix is included for provision of sample system runs.

1972

38795

APTIC NO. 60949

Ballinger, D.

ENVIRONMENTAL MONITORING-WORKSHOP 5. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Interagency Conf. Environ., Livermore, Calif., 1972, CONF 721002, p. 330. (Oct. 17-19.)

A critical assessment of the current monitoring practices revealed that the current monitoring efforts are not sufficient to determine the total exposure of a typical urban resident to pollutants from all sources. Therefore, extensive research on sampling methods, atmospheric dispersion modeling, and biological damage levels for the various pollutants would be required. Regarding the optimum approach to determining total exposure to man, monitoring of the urban resident per se by analysis of autopsy specimens, samples from urban blood banks, body fluid or tissue samples collected in hospitals, and statistics of respiratory and other pollutant-induced diseases were proposed. Other proposals emphasize controlling emissions at the source, while others call for research to improve monitoring, and for saturation measurements to improve dispersion models and to improve compliance with environmental quality standards. The emphasis during this knowledge-gathering period should include trend analysis and research to establish damage level for the pollutants, identifying the critical pathways leading to exposure to man, and to identify indicator organisms in the food chain.

38796

APTIC NO. 60932

Barth, D. S., W. F. Durham, C. R. Porter, and J. C. Cross

ENVIRONMENTAL STANDARDS. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf. Environ., Livermore, Calif., 1972, CONF 721002, p. 36-51, 69-70. 23 refs. (Oct. 17-19.)

The principles of the environmental standard-setting activity of the Environmental Protection Agency are outlined. Environmental standard-setting requires research on effects, adequate measurement methods, identification and quantification of mobile and stationary sources, environmental quality surveillance, predictive modeling linking source emissions to subsequent environmental levels, and control technology for significant sources. Criteria and control technique documents have been issued and National Primary and Secondary Ambient Air Quality Standards have been promulgated for such air pollutants as sulfur dioxide, particulate matter, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide. Standards of performance have been established for fossil fuel-fired steam generators, municipal incinerators, cement plants, nitric acid plants, and sulfuric acid plants. National emission standards for stationary sources, motor vehicles, and aircraft have been implemented. Evaluative technical reports were prepared for fluorides, lead, polycyclic organic substances, and asbestos.

38797

APTIC NO. 58610

Cerny, James W.

DEFINITION OF AIR POLLUTION CONTROL REGIONS IN PENNSYLVANIA. Proc. New England-St. Lawrence Valley Geograph. Soc., vol. 2:75-79, 1972. 8 refs.

The air pollution control regions in Pennsylvania were defined using analysis as a data filter coupled to a hierarchical clustering algorithm. The original set of regions were not originally established to achieve air pollution control, but as health regions. Seven social, economic, and meteorologic variables were chosen as readily available indicators of the quality and quantity of pollution in the 67 counties: 1966 estimated mid-year population, 1963 value added by manufacturing, 1963 number of establishments with 20 or more employees in heavy industry, 1966 number of motor vehicles, mean maximum mixing depth in July, annual inversion frequency, and number of high pollution potential days forecast per year. The resulting six homogeneous control regions are very different in area and orientation from the original regions. The differences suggest that considerable changes could be made to improve the homogeneity of pollution problems. Implementation difficulties and limitations are discussed.

38798

APTIC NO. 60943

Croke, E. J. and J. E. Norco

FEDERAL LABORATORIES AS CENTERS OF EXCELLENCE IN THE ENVIRONMENTAL SCIENCES—A CASE STUDY. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 287-301. 8 refs. (Oct. 17-19.)

The role of Federal research laboratories is considered in terms of establishing a national scientific resource that can provide general scientific support for all levels of government, particularly in regard to current Environmental Protection Agency interest in the setting up of regional environmental studies centers. The evolution of the environmental studies program at Argonne National Laboratory, from its inception in 1967 with the Chicago Air Pollution Systems Analysis Program to its present level of diversification, is presented as a case study of how a mission-oriented, interdisciplinary research center can develop from a core project involving both a federal sponsor and a local agency of government. A listing is provided of environmental research programs being conducted at Atomic Energy Commission and National Aeronautics and Space Administration installations.

38799

APTIC NO. 60830

Ducsik, Dennis W.

THE FRAMEWORK FOR ANALYSIS. In: Power, Pollution, and Public Policy. Issues in Electric Power Production, Shoreline Recreation, and Air and Water Pollution

Facing New England and the Nation. Massachusetts Inst. of Tech., Cambridge, M.I.T. Rept. 24, p. 5-28, 1972. 7 refs.

An analytical framework for public decision-making within which important environmental problems can be defined, their cause identified, and alternative solutions evaluated is presented from the standpoint of social balance and efficiency in the allocation of scarce resources. The problems of air and water pollution are cited as classic examples of external effects which occur largely because of the difficulty in imposing direct monetary responsibility on those who benefit from pollution. Political barriers to effective action are enumerated, and guidelines are presented for decision-making.

38800

APTIC NO. 60968

Franco, Francisco

ACT NO. 38/1972 OF DEC. 22 ON THE PROTECTION OF THE ATMOSPHERE. (Ley 38/1972, de 22 de diciembre, de protección del ambiente atmosférico). Text in Spanish. B. O. del E., no. 309:23031-23034, Dec. 1972.

General provisions of the Clean Air Maintenance Act adopted in Spain in Dec. 1972 are outlined. The law provides for the establishment of air quality standards, maximum allowable pollutant concentrations in the air, and of emission standards for industries, heat sources, and motor vehicles, and it requires the implementation of measures necessary for these standards to be met. Areas with particularly high air pollution levels will be determined for systematic air quality monitoring. Air pollution monitoring networks will be used to determine emergency situations with pollution levels in excess of the allowable standards, during which emergency measures for pollution abatement will be taken. Industrial facilities and heat generating facilities will be required to keep less-polluting fuels on store, and all motor vehicle by private persons and commerce will be prohibited during emergency periods. Approval by authorities will be required for the establishment of industrial facilities representing potential hazards of air pollution.

38801

APTIC NO. 60942

Gove, Norwood and Velvin Watson

SURVEY OF AEC AND NASA CAPABILITIES IN COMPUTERIZED DATA MANAGEMENT. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 275-286. (Oct. 17-19.)

Existing Atomic Energy Commission and National Aeronautics and Space Administration facilities which could contribute to environmental data management and which include some of the world's largest, fastest computers and most highly developed data management and retrieval systems are reviewed. Tables of some AEC and NASA large computers and large data management projects are provided along with appendices concerning concepts and definitions pertaining to data bases and comparison of data management systems.

38802

APTIC NO. 60931

Greenfield, Stanley M.

AN OVERVIEW OF RESEARCH IN THE ENVIRONMENTAL PROTECTION AGENCY. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf. Environ., Livermore, Calif., 1972, CONF 721002, p. 23-35. 1 ref. (Oct. 17-19.)

Environmental research conducted by and on behalf of the Environmental Protection Agency is overviewed. The review of environmental impact statements, the setting and enforcing of nationwide air quality standards, and organization and coordination of environmentally related research and development efforts are among the major tasks of EPA. Direct Federal regulations of industrial air pollution have been established for new or substantially modified installations in the five most-

polluting types of industry; fuel-burning steam generators, large incinerators, and plants producing cement, sulfuric acid, and nitric acid. Expansion and improvement of environmental monitoring and surveillance to provide baselines of environmental quality; better understanding of long-term exposure to contaminants; examination of subacute or delayed effects on humans and other organisms; study of the combined and synergistic actions of chemical, biological, and physical stresses; acceleration of applied research into the control of pollutants; development of non-polluting production processes; improved assessment of trends of technical and social change and potential effects on environmental quality; studies on the transport of pollutants through the environment and their passage through air, water, and land; and changes and transformations affecting pollutant toxicity are among the major aims of EPA's research efforts. Comparative epidemiological studies are conducted to determine relationships between morbidity, mortality, and specific pollutants.

38803

APTIC NO. 60941

Hammerle, James R.

NATIONAL AIR DATA BRANCH: NEDS/SAROAD. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 265-274. (Oct. 17-19.)

The flow of air quality and emission data to and from the states through the Environmental Protection Agency's regional offices and headquarters is discussed in terms of the organization of the Monitoring and Data Analysis Division and various data handling systems. Topics covered include: the National Emissions Data System (NEDS), Storage and Retrieval of Aerometric Data (SAROAD), specifications for NEDS and SAROAD, the National Emissions Data Bank (NEDB) and NEDB compatible systems, systems for state and local agencies and regional offices, data flow for NEDB and NADB, data validation, computerized retrievals by NEDS/SAROAD, requests for confidentiality of selected items of data, publications of data by the National Air Data Branch, obligations of EPA Regional Offices, and future activities of the National Air Data Branch.

38804

APTIC NO. 60799

Hekimian, Kenneth Karekeen

PART I. AN INTEGRATED METHODOLOGY FOR ENVIRONMENTAL QUALITY MANAGEMENT. In: A Systems Engineering Approach to Environmental Quality Management with Emphasis on Solid Waste Management. Southern California Univ., Los Angeles, Dept. of Sanitary and Municipal Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Order no. 73-7252, 1972, p. 1-102. 37 refs.

Environmental quality management including models of waste flow, economic analysis, and decision making for air, land, and water pollution control and solid waste management is reviewed. Three models of waste flow are reviewed. Existing models use the concept of materials balance in order to compute the amount of raw materials, finished good, by-products, and waste products in a sector of the economy. Two models of economic analysis are reviewed. The cost-benefit analysis is introduced and is a rational basis for economic analysis for environmental quality management. There are erroneous results in the application of this analysis. In air pollution control, the Federal government equates benefits with savings in cleaning costs, neglecting completely the health damage due to air pollution. A review of existing public decision making models indicates that there is no existing model of economics or politics sufficiently developed to yield an optimal solution. Centralized decision making is particularly conducive to environmental quality management, but compromise is required between centralized and decentralized decision making. New models for analyzing environmental problems are developed for each area. (Author summary modified)

222

38805

APTIC NO. 60934

House, Peter

THE MISSION AND WORK PROGRAMS OF THE ENVIRONMENTAL STUDIES DIVISION OF EPA. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 71-80. (Oct. 17-19.)

The task structure and specific work programs are described with respect to the mission of the Environmental Studies Division (Environmental Protection Agency) to develop means to predict future environmental problems and to devise practical planning and policy guidance tools for alleviation of environmental problems. The task structure is comprised of investigation in the following areas: environmental modeling and methodologies development; comprehensive environmental planning; and environmental management. Work programs for 1972 and 1973 are outlined by task category and project, and allocation of research budget is outlined by task category.

38806

APTIC NO. 60944

Kostyk, N. L.

CITIES, STATES, AND NATIONAL LABORATORIES - AN ACCOUNT OF PRODUCTIVE INTERACTION. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 302-314. (Oct. 17-19.)

Research programs involved in resolving environmental degradation and resource management problems are outlined for the following Atomic Energy Commission and National Aeronautics and Space Administration laboratories: Aerojet Nuclear Company, Ames Laboratory, Battelle-Northwest Laboratory, Brookhaven National Laboratory, Health and Safety Laboratory, Lawrence Berkeley Laboratory, Los Alamos Scientific Laboratory, Oak Ridge National Laboratory, Savannah River Laboratory, Ames Research Center, Goddard Space Flight Center, Jet Propulsion Laboratory, Langley Research Center, Lewis Research Center, Manned Spacecraft Center, and Mississippi Test Facility. Areas of air pollution currently being researched by these laboratories include: pesticide analysis, air pollution implementation plans, the effects of airport operations on air quality, pollen dispersion studies, atmospheric aerosol studies, ecological effects of natural and man-made radioactivity, tropospheric analysis, stratospheric modeling, identification of urban trace element and compound pollutant sets, diffusion models, global atmospheric sampling, remote sensing methods of detection, and various other research activities relating to airborne contamination.

38807

APTIC NO. 60947

Lederman, P.

UNIFIED DATA SYSTEM-WORKSHOP 4. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf. Environ., Livermore, Calif., 1972, CONF 721002, p. 328-329. (Oct. 17-19.)

The need for a unified data system covering air quality, water quality, solid wastes, noise, radiation, and pesticides was discussed. A single, all-inclusive data system should not be developed, because such a system would not be able to meet the great variety of demands, e.g., enforcement versus health effects research. Also, it would impose severe restrictions in that all data would have to be common in format, and it would inhibit system development, enlargement to new areas, and innovation. A center to facilitate data bank accessibility, interchange, and interface, should be established. The activities of such a center would include collecting information on existing data bases, studying cases of overlap, duplication, and omission, studying data formats and geographical codes, direct searches of the appropriate data base for some queries, performing and acting as a referral center for more difficult que-

ries, preparing computerized files containing reference information on existing data bases, maintaining information on data interchange methods, and developing an interface capability.

38808

APTIC NO. 60950

Maninger, C.

TRANSFER OF SCIENTISTS-WORKSHOP 9. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Interagency Conf. Environ., Livermore, Calif., 1972, CONF 721002, p. 337-339. (Oct. 17-19.)

The possibilities of the effective utilization of scientific, technical, and management expertise and experience for enhancing cooperation in environmental research among Federal agencies and their laboratories are outlined. The most effective means of transferring knowledge between institutions is through exchange of personnel, especially in such common areas as the projection and development of technology in pollution measurement, abatement, and control; the development and specification of methods for impact assessment; model development concerning emission sources, transport, and interaction effects; data accumulation, processing, and presentation, as well as compliance assessment and enforcement. Personnel transfer may be on a short-term basis, by assigning liaison officers in permanent positions, joint symposia on selected topics, and internships. Cooperation is also possible through cooperative programs without exchange of funds and personnel.

38809

APTIC NO. 60937

Morgan, G., G. Ozolins, and W. Sayers

MONITORING ENVIRONMENTAL QUALITY. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf., Environ., Livermore, Calif., 1972, CONF 721002, p. 166-176. (Oct. 17-19.)

Nationwide environmental monitoring is reviewed in terms of present and future needs and responsibilities of Federal, state, and local control agencies, as well as the private and industrial sector, in participating to achieve a cooperative and unified system for collecting, storing, analyzing, and interpreting environmental data. The Environmental Protection Agency is currently focusing its monitoring efforts on the following five areas: closer coordination of environmental monitoring programs at all levels of government; closer coordination of monitoring activities across media lines; increased utility and timeliness of data through comprehensive information systems and modeling techniques; increased accuracy of data through a strong method standardization and quality control program; and improved instrumentation through research and adaptation of monitoring techniques and approaches used in other fields.

38810

APTIC NO. 60930

Talley, Wilson K.

THE FEDERAL GOVERNMENT, THE NATIONAL LABORATORIES, AND THE ENVIRONMENT. Environmental Protection Agency and Atomic Energy Commission, Washington, D. C., Proc. Interagency Conf. Environ., Livermore, Calif., 1972, CONF 721002, p. 11-22. (Oct. 17-19.)

The prehistory, statutes, and the activity of the Environmental Protection Agency are outlined. The EPA was created as an entirely independent agency as the pollution control programs had been fragmented among several government agencies. All standard-setting authority covering all major classes of pollutants and also the two principal transporting media, air and water, was transferred to EPA which was also given research capability, competence to convert research into standards, and ability to suggest needed research. The EPA occupies a pivotal position with respect to funding research and development, in that it directs all financial resources to the best available capabilities. The total outlay for research, development, and opera-

tions in such programs as the observation and prediction of weather and ocean conditions, locating and describing natural resources, physical environmental surveys, weather modification, research on environmental impact on man, and ecological and other basic environmental research rose from \$856,000,000 in 1971 to \$951,000,000 in 1972, and to an estimated \$1,051,000,000 in 1973.

38811

APTIC NO. 60646

ENVIRONMENTAL PROTECTION. (Umweltschutz). Text in German. TUE Tech. Ueberwach., 13(5):181-187, May 1972.

Regulations adopted in West Germany concerning environmental protection, and the activities of the Technical Inspection (Technische Ueberwachung) in such areas as air pollution, water pollution, noise pollution, and waste disposal, are surveyed. Combustion equipment for gaseous fuels with a minimum capacity of 500 Gcal/h melting plants for pig iron, noble metals, light and heavy metals, gas turbines, equipment for the manufacturing of detergents and soap, and storage tanks for combustible gases are among the equipment that have been newly added to the list of industrial equipment subject to approval prior to establishment regarding particulate and gaseous emissions. The Technical Inspection is mainly concerned with the measurement of particulate emissions from boilers, and of emissions of sulfur dioxide, sulfuric acid, gaseous fluorides and chlorides, gaseous ammonia compounds, hydrochloric acid, hydrogen sulfide, nitrogen oxides, hydrocarbons, and carbon monoxide. Measurement of the idle CO emission, of the crankcase ventilation, and of exhaust emissions according to the European cycle are required for gasoline engines.

38812

APTIC NO. 60880

Committee on Interior and Insular Affairs (U. S. Congress)

ENERGY RESEARCH POLICY ALTERNATIVES. 92nd Congress (Senate), Second Session, Serial no. 92-30, 821p., June 7, 1972. 160 refs. (Hearing before the Committee on Interior and Insular Affairs, U. S. Senate, Pursuant to S. Res. 45, A National Fuels and Energy Policy Study.)

GPO

Testimony on Federal energy research and development (R and D) policies and the available technological options and alternatives is presented. A major source of the energy R and D emphasis is meeting the growing demands for energy without degrading the environment. There was an 11% increase in the R and D funding from 1969 to 1973 due in part to several key efforts including the fast breeder nuclear reactor, coal gasification, sulfur oxide removal from the fossil fuel stack gases, and controlled thermonuclear fusion. There is a trend toward a Federal R and D program which balances the energy resources of the nation and the engineering R and D required to utilize those resources most effectively. Coal resource R and D funding is growing at a faster rate than nuclear power funding, 305% compared to 29% over the 5-year period. Significant increases in funding for stack gas cleanup technology and coal gasification are aimed at making the coal supply available for both electric generation and industry.

38813

APTIC NO. 60860

Minister fuer Arbeit, Gesundheit und Soziales des Landes Nordrhein-Westfalen (West Germany)

PART 1. GENERALITIES. (1. Allgemeines). Text in German. In: Emissionskataster Koeln. Bericht ueber den Stand der Modelluntersuchung in Grossraum Koeln zur Aufstellung eines Emissionskatasters fuer luftverunreinigende Stoffe. p.9-21, 1972.

The procedure applied in establishing an emission survey over the Koeln area, and the possible uses of the emission survey are described. Emission sources in industry (point and area

sources), household and trade (area sources in households, as well as area and point sources in trade), and in automobile traffic (line sources) are covered by the emission survey. The emission and source data, along with data on meteorological conditions in the test area (temperature, humidity, distribution of wind speeds and wind directions) are fed into a computer for evaluation and subsequent corrections. The emission survey thus obtained will be suitable for the determination of the respective shares of different emission sources and groups of emission sources in the emission of specific air pollutant components, and it will allow conclusions to be drawn regarding emission abatement measures to be implemented. The efficiency of emission control measures taken on the basis of such a survey may be evaluated. Such emission surveys are also valuable aids in decisions on the creation of new industrial facilities, potential emission sources, and in general area planning regarding the determination of the minimum distance between residential and industrial areas.

1971

38814

APTIC NO. 60534

Buckley, J.

ENVIRONMENTAL RESEARCH: DIFFUSION OF KNOWLEDGE: TRAINING IN ENVIRONMENTAL DISCIPLINES: PUBLIC EDUCATION, INFORMATION AND PARTICIPATION. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 200-202. (May 2-15.)

The organizational and institutional arrangements of environmental research and education in the U. S. are reviewed. The national agencies and departments involved with pesticide, radiation, solid waste, noise, thermal, air, water, and land pollution are listed. About 1/3 of the pollution research is carried out in 120 Federally operated laboratories, and the balance is carried out through contracts and grants to industry, universities, and other organizations. There are a number of sources of environmental information in the U. S. which are listed. In 1970, 138 colleges and universities and 60 junior colleges offered training in environmental disciplines. Public education, information, and participation on environmental issues is increasing.

38815

APTIC NO. 60533

Gülin, Alan

LOCATION OF INDUSTRY. In: Air Pollution. St. Lucia, Australia, University of Queensland Press, 1971, Chapt. 8, p. 59-63.

Industry should be located in clearly defined areas and insulated from the rest of the community by green belts of substantial depth. Wherever industry unavoidably comes close to residential areas, a measure of insulation should always be retained by means of trees and shrubs planted to a depth of 30 to 100 m, which will also help to suppress noise and modify the visual impact. Mass emitters should not be located where chimneys of adequate height cannot be constructed (due to aviation requirements). If a proposed new area for industry will contribute to existing high concentrations of air pollution, the area may be regarded as unsuitable for all or certain classes of industry, or as calling for exceptionally stringent controls. Zoning should take account of wind movement, and micrometeorological studies are necessary. While zoning may be based on permissible emission limits from industrial plants or on ambient air standards, allowance should be made for the excessive emissions which may arise as a result of equipment failure and the possible frequency of these. Planning and zoning should take the long view of air pollution control looking half a century ahead.

224

38816

APTIC NO. 60535

Gladkov, N. A.

ENVIRONMENTAL RESEARCH: DIFFUSION OF KNOWLEDGE: TRAINING: PUBLIC EDUCATION, INFORMATION AND PARTICIPATION. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 197-200. (May 2-15.)

Environmental pollution and pollution control are generally reviewed in the context of research carried out in the USSR. Research programs of various departments, coordination of research, and the diffusion of knowledge among industry, governments, and the public are described. Many societies, universities, and institutes distribute environmental knowledge by training courses, conferences, seminars, newspapers, and other means.

38817

APTIC NO. 60571

Hesler, A. von.

AIR HYGIENE, CLIMATE, AND MUNICIPAL DEVELOPMENT. (Lufthygiene, Klima, Siedlungsentwicklung). Text in German. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), Lufthyg.-Meteorol. Modelluntersuch. Reg. Untermain, 4th, Frankfurt am Main, West Germany, 1971, p. 8-17. (Nov. 4-5.)

Demographic and socio-economic data gathered for the Lower Main region around Frankfurt am Main, as well as the basic objectives of an environmental model study of that region for related decisions and space planning are presented. The increase in the population during the 1965-1970 period entailed the creation of new jobs, and consequently an expansion of industrially used space representing now emission area. Further population growth in the area will lead to more emissions. However, green zones and forest belts with recreational facilities between industrial and residential areas will be required along with measures for the minimization of industrial, traffic, and domestic heating-generated emissions. The measures taken recently to curb automotive emissions are far from being sufficient. The very serious nuisances generated by domestic heating emissions can be substantially reduced by the use of natural gas and electricity instead of fuel oil, and by remote heating. The results of the current model study and of the air pollution measurement will be compared with corresponding results to be gathered in the USA and in Turkey.

38818

APTIC NO. 60530

Kolbasov, O.

GOVERNMENT POLICIES AND STRATEGIES RELATING TO ENVIRONMENT: LONG-TERM GOVERNMENT POLICY, PROCEDURES AND PLANNING OF ENVIRONMENT PROTECTION IN THE USSR. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 167-173. (May 2-15.)

Environmental problems in the USSR, long-term government policy, procedures and planning of environmental protection in the Soviet Union, and legislation in the USSR are reviewed. Policies are outlined with regard to water, air, noise, radiation, and pesticide pollution and land use and nature protection. Economic, technical, and organizational measures on the protection of the environment are taken regularly in the Soviet Union by specialized State institutions, organizations, and consumers of natural resources.

38819

APTIC NO. 60537

Krstic, B., F. Lemoine, S. Borovnica, and V. Teeriyack

NATIONAL LEGISLATION RELATING TO ENVIRONMENT. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating En-

viron., Prague, Czechoslovakia, 1971, p. 173-180. 6 refs. (May 215.)

The history of past legislation and present legislation in Belgium, Yugoslavia, Sweden, and other countries are described. The objectives of the legislation are the protection of nature, protection of the soil, protection of water, air protection, protection of urban sites, disfunctioning or urban areas, garbage disposal, and protection against noise, vibrations, radiation, and disasters. Many laws contain prohibitions, restrictions, environmental planning regulations, building permit and zoning regulations, programs for the environment, financing sections, expropriation and restrictions in the right of ownership, standards and regulations, requirements for administration and control, and sanctions. Belgian, Swedish, and Yugoslavian legislation is reviewed.

38820

APTIC NO. 60572

Lamp, W.

MEASURING NETWORK. (Das Messstellennetz). Text in German. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), Lufthyg.-Meteorol. Modelluntersuch. Reg. Untermain, 4th, Frankfurt am Main, West Germany, 1971, p. 17-20. (Nov. 4-5.)

Systematic measurements of meteorologic and air hygienic data were begun in August 1971 within the framework of an air hygienic and meteorologic model study of the Lower Main region in West Germany. The thirty-five meteorologic and air hygienic parameters, systematically measured at a total of 506 meteorological and sampling stations, include wind, temperature, relative humidity, precipitation, cloudiness, global radiation, as well as such pollutants as dust, sulfur dioxide, carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons, lead, fluorides, chlorides, formaldehyde, and phenols. These measurements are completed with lichen explant experiments.

38821

APTIC NO. 60578

Lamp, W.

WORKING AND COST PLAN, INFRARED AERIAL PHOTOGRAPHS, EMISSION SURVEY. (Arbeits- und Kostenplan, Infrarotbefliegung, Emissionskataster). Text in German. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), Lufthyg.-Meteorol. Modelluntersuch. Reg. Untermain, 4th, Frankfurt am Main, West Germany, 1971, p. 55-63. (Nov. 4-5.)

The working and cost plan cost plan of the air hygienic and meteorologic model study being conducted in the Lower Main region in West Germany is presented. The working and cost plan specifies the duration of the meteorologic observations and air pollutant concentration measurements, the meteorologic and air hygienic parameters to be measured, the deadlines of the data processing and evaluation, as well as of the elaboration of the models, the cost plan for the period ending 1975, and the cooperating institutions. Infrared aerial photographs are planned to be taken during nights with clear sky and slow wind. The survey to be conducted on sulfur dioxide emissions will cover industrial plants with a minimum hourly SO₂ emission of 10 kg, other industrial plants with hourly emission rates between 1 and 9 kg, as punctiform sources, domestic heating-gas-rated emissions from area sources, and traffic-generated SO₂ emissions from linear sources. Questionnaires with relevant questions concerning the site, height, diameter, gas flow rate at the outlet of the stacks, and flue gas temperature were sent out to the industrial plants with a minimum SO₂ emission of 10 kg/hr.

38822

APTIC NO. 60514

Martin, E.

LOCAL GOVERNMENT AND ENVIRONMENT. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 226-231. (May 2-15.)

The work of local governments to solve environmental problems is generally discussed. Several countries have had a redefinition of local government boundaries on the basis of urban and rural areas. In instances where redivision of local governments is not feasible, various forms of cooperation are a means of offsetting too much fragmentation, particularly in the handling of environmental problems. In some urban areas, new units of government have been created. The internal administration of local governments, the need for land, housing, and transportation policies, use of modern management techniques, financing local government environmental control activities, international action, and citizen participation in environmental problems are described.

38823

APTIC NO. 59212

Middleton, John T.

PLANNING AGAINST AIR POLLUTION. Am. Scientist, 59(2):188-194, March-April 1971.

Motor vehicles cause almost half of all air pollution in the U. S. They account for more than half the hydrocarbons, nearly half the nitrogen oxides, 2/3 of the carbon monoxide, most of the lead, and photochemical oxidant production. The Clean Air Act and the Federal Clean Car Incentive program have been set up to reduce automobile pollution. The Clean Air Act has also set air quality standards and emission standards for industrial pollutants, including stationary sources. Sulfur oxides are a major industrial pollutant. Because of the need for more energy, new, low-polluting forms of energy are being studied, and new fuel and energy policies are being developed which take pollution into account. The effects and sources of sulfur oxide and particulate pollution are discussed. Weather is a vital factor in pollution because pollution can affect weather, weather can cause increased or decreased pollution concentrations, and precipitation can remove pollution from the atmosphere. Antipollution strategies are mentioned. The task of relating clean air goals to the design of emission controls is a function of simulation modeling using computers and plotting techniques. The Chicago control plan for emission rights would use the zoning ordinance as a device to control legally the effective emission density associated with each parcel of land in the region. It would limit land use to achieve air quality standards. The role of the scientist in pollution control is discussed in general.

38824

APTIC NO. 60863

Morpurgo, P.

INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENTAL MANAGEMENT. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 217-224. 9 refs. (May 2-15.) (Presented at the ECE Meeting of Senior Governmental Advisers on Environment, 1970, Paper 3.)

The organizational and institutional arrangements, procedures, and operational measures at different governmental levels of the Federal Republic of Germany, Poland, Sweden, the United Kingdom, and Yugoslavia are reviewed. The common problems of these countries include failure to exercise sufficient control over land use, insufficient and poor urban planning, and patterns of production, distribution, and consumption which are often responsible for widespread environmental disfunctions. Common features of the countries are the use of more comprehensive views of environmental problems and policies than previously, institutional innovations, and increased cooperation between governments, industry, and the public. The institutional arrangements in the five countries are reviewed including environmental management, historical development, diversity, reorganization, governmental levels (central, intermediate, and local), reorganization of local authorities, centralization, and decentralization. The machinery, need, and types of coordination in the governments of these countries are reviewed. The decision making process in

these countries includes growing awareness of environmental quality, public participation, the interests of industry and agriculture, scientific and medical opinion, and cabinet-level decisions. The character and application of legislation and international cooperation are reviewed.

38825

APTIC NO. 60508

Nielson, V. R. N.

ACTIVITIES OF THE ECE IN THE FIELD OF HOUSING BUILDING AND PLANNING RELATING TO ENVIRONMENT. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 302-312. (May 2-15.)

The environmental problems in the field of housing, building, and planning and the activities of the Economic Commission of Europe in solving these problems are described. The relationships between physical planning and urban development policies and policies related to environmental protection and improvement are outlined. Environmental problems and policies of direct concern to those responsible for the provision of housing and related facilities and services are discussed. Environmental problems emerging from the production and use of building materials and components, as well as the important and positive contribution by the construction industry to the creation of a pleasant and well-functioning environment are reviewed.

38826

APTIC NO. 60536

Prunk, S. E. and K. Vellema

ORGANIZATIONAL AND INSTITUTIONAL ARRANGEMENTS, PROCEDURES AND OPERATIONAL MEASURES. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 184-186. (May 2-15.)

In the Netherlands, the formulation and execution of a long-term environmental policy at the national level is still at an early stage of development. Two memorandums on physical planning in the Netherlands have been issued. National legislation relating to the environment is limited and consists of chiefly the Physical Planning Act of 1965. Several institutions and organizations have been set up to conduct research on the environment and to control the effects of pollution. These are mentioned.

38827

APTIC NO. 60540

Netherlands Ministry of Cultural Affairs, Recreation and Social Welfare, Rijswijk, Dept. of Nature and Country-side Preservation

ENVIRONMENTAL INFORMATION AND EDUCATION. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 191-196. 8 refs. (May 2-15.)

The responsibilities, concepts, and goals of environmental information and education are generally reviewed. Many Dutch people are alienated from the natural environment and are unconcerned about pollution and exploitation of natural resources. Therefore an effective conservation education and information program must be developed which would include pre-school, primary-school, and secondary-school children, as well as university and out-of-school education. An ideal/typical organization for environmental education is described. The results of a public opinion poll on knowledge and involvement with regard to the problems in the human environment field are described. According to this survey, most people knew about European Conservation Year, were worrying about the environment, and were willing to do something about pollution.

226

38828

APTIC NO. 60541

United Nations Economic Commission for Europe, New York
ORGANIZATIONAL AND INSTITUTIONAL ARRANGEMENTS, PROCEDURES AND OPERATIONAL MEASURES: UNITED STATES FEDERAL LEVEL ENVIRONMENTAL ORGANIZATIONS - THE COUNCIL OF ENVIRONMENTAL QUALITY AND THE ENVIRONMENTAL PROTECTION AGENCY. Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 186-190. (May 2-15.)

Federal institutions for environmental quality are described including the Council on Environmental Quality established by the National Environmental Policy Act of 1969 and the Environmental Protection Agency established in 1970. These organizations combined and consolidated environmental research and control programs formerly run by many agencies. The process of evaluating environmental factors in decision making, environmental policy in the U. S., the centralization of environmental management, and the activities of the Council on Environmental Quality and the Environmental Protection Agency are reviewed.

38829

APTIC NO. 60542

United Nations Economic Commission for Europe, New York
ORGANIZATIONAL AND INSTITUTIONAL ARRANGEMENTS, IMPLEMENTATION PROCEDURES AND OPERATIONAL MEASURES AT DIFFERENT GOVERNMENT LEVELS IN CZECHOSLOVAKIA. Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 180-184. (May 2-15.)

The organizations and institutions which are evolved in environmental control and research in Czechoslovakia are reviewed. The functions of the Ministry of Health, the Ministry of Forestry and Water Conservancy, the Ministry of Agriculture and Nutrition, the Ministry of Culture, the Ministry of Construction and Technology, other central authorities, and local National Committees with respect to the environment are listed. The conceptual approach to the solution of environmental problems is described.

38830

APTIC NO. 60543

United Nations Economic Commission for Europe, New York
FEASIBILITY STUDY ON INTERNATIONAL ENVIRONMENTAL INFORMATION EXCHANGE. FIRST STAGE OF A FEASIBILITY STUDY AND A DRAFT PLAN OF ACTION ON SUITABLE INTERNATIONAL ARRANGEMENTS AIMED AT FACILITATING AND COORDINATING THE EXCHANGE OF ENVIRONMENTAL INFORMATION AMONG THE COUNTRIES OF THE ECE REGION. Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 241-257. (May 2-15.)

A feasibility study and draft plan of action are presented on suitable international arrangements for the economic Commission for Europe which would facilitate and coordinate the exchange of existing environmental information among the countries of the ECE region. The feasibility study examines the problems and questions related to a possible international information exchange system. Four annexes are attached which summarize opinions expressed by various governments on this matter, list examples of the methods for the exchange of information as applied in existing information centers, describe the activities of some other international organizations relating to the collection and exchange of environmental information, and draw attention to the steps envisaged to be taken at the 1972 U.N. Conference on the Human Environment with respect to the exchange of environmental information.

38831

APTIC NO. 60612

United Nations Educational, Scientific, and Cultural Organization, New York

ENVIRONMENTAL RESEARCH AND TRAINING IN UNESCO PROGRAMMES. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 234-240. (May 2-15.)

The United Nations Education, Scientific, and Cultural Organization (UNESCO) has conducted and is conducting a number of programs on environmental problems. A plan for long-term intergovernmental and interdisciplinary programs on the rational use and conservation of the natural environment and its resources, on the scientific, technical, and educational aspects of the problems relating to rational use and conservation of natural resources, and on the improvement of the human environment and the increase in productivity was established. A long-term project on man and his environment was also set up, and several symposiums and meetings were held on this subject. The various projects which are being carried out are reviewed. These study the natural environment, the rural environment, urban areas, and pollution. UNESCO is also studying hydrology, marine science, social sciences, and culture. The various educational, training, and informative programs of UNESCO are discussed.

38832

APTIC NO. 60641

United Nations, Div. of Social Affairs

POPULAR INITIATIVE AND POPULAR PARTICIPATION IN ENVIRONMENTAL POLICIES. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 314-320. 1 ref. (May 2-15.)

The popular initiative and participation in promoting, formulating, and implementing national and local policies and programs aimed at protecting or improving the human environment are described in general terms. Popular initiative and popular participation may be defined as initiatives taken and participation exercised by either ad hoc citizens groups specifically organized to take action against environmental deterioration and to promote environmental improvement, or by existing nongovernmental organizations concerned with environmental problems. The procedures in the consultation processes which occur as industries and organizations considering environmental problems are reviewed, as are the roles of citizens groups and nongovernmental groups.

38833

APTIC NO. 60644

World Health Organization

LONG-TERM PROGRAMME OF THE WHO REGIONAL OFFICE FOR EUROPE IN ENVIRONMENTAL POLLUTION CONTROL. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 331-335. 3 refs. (May 2-15.)

The European Regional Office of the World Health Organization is working on environmental change and control of pollution and is geared to the special problems of Europe. This office forms part of the WHO global program to study the problems of environmental pollution and to determine their solution. Many WHO studies are concerned with the effects of pollution (both air and water) on public health. Noise, solid waste disposal, and radioactive particle problems are also being studied. The WHO regional office has attempted to determine the present and future situation of pollution control, including legislation, administrative measures, studies, and control plans in various European countries. The Regional Office has been involved with meetings, seminars, conferences, and a long-term program to study and control pollution. These various aspects of the work of the WHO and of the Regional Office are generally reviewed.

38834

APTIC NO. 60645

United Nations Economic Commission for Europe, Council for Mutual Economic Assistance

INFORMATION ON ACTIVITIES OF THE COUNCIL FOR MUTUAL ECONOMIC ASSISTANCE (CMEA) RELATING TO ENVIRONMENT. United Nations Economic Commission for Europe, New York, Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 320-324. (May 2-15.)

The Council for Mutual Economic Assistance is very interested in solving air pollution problems. Work in progress covers studies on town planning, geological prospecting, amelioration and conservation, protection of water resources from pollution and depletion, control of air pollution, building and radiation safety measures, and development of comprehensive nature conservancy measures. Air pollution control studies include studies of sulfur dioxide removal, of dust collection, of sanitary and hygienic problems connected with the pollution of the air in communities, of pollution by automobile exhaust and its control, of sewage purification, of dust collection and prevention at nonferrous metal plants, of prevention of pollution at steel plants, and of prevention of pollution caused by mining, coke factories, ferroalloy manufacture, and other sources. The Council for Mutual Economic Assistance is also aiding in the preparation of various air quality and emission standards.

38835

APTIC NO. 60649

United Nations Economic Commission for Europe, New York

LONG-TERM GOVERNMENT OBJECTIVES, PROCEDURES AND OPERATIONAL PLANNING IN THE FIELD OF ENVIRONMENT IN FRANCE. Proc. ECE Symp. Prob. Relating Environ., Prague, Czechoslovakia, 1971, p. 161-167. (May 2-15.)

The long-term aims of government and the procedures and operational planning which are not very precise or accurately defined are described for France. The aims of French environmental policy and official statements by the Prime Minister are reviewed. Procedures adopted to define and implement French environmental policy include the Hundred Measures campaign, interministerial coordination, and the creation of a Ministry for the Protection of Nature and the Environment. Long-term operational planning, concrete proposals, measures for the prevention of air pollution and water pollution, proposals, costs of planning, and waste and automobile disposal are described.

1970

38836

APTIC NO. 60831

Ducsik, Dennis W.

REGIONAL GOVERNMENT IN NEW ENGLAND: A PROTOTYPE. In: Power, Pollution, and Public Policy. Issues in Electric Power Production, Shoreline Recreation, and Air and Water Pollution Facing New England and the Nation. Massachusetts Inst. of Tech., Cambridge, M.I.T. Rept. 24, p. 283-316, 1970. 51 refs.

A tax control structure designed to control sub-regional land use and to discharge overpopulation and pollution is proposed as part of a three-phase plan for implementing regional government in the New England area. The overall plan is based on the sub-regional concept whereby sub-regions would be established in accordance with natural geography, existing land use, current trends in legislation concerning intrastate governmental consolidation efforts, existing interstate cooperation and consolidation efforts, existing federal land-use policies and restrictions, and socially- and ecologically desirable conditions such as tolerable pollution levels. The tax system would involve a sophisticated manipulation of a system of credits and deductions to encourage proper land use and abatement of pollution among other factors. A tentative tax schedule is illustrated by land use classifications.

227

38837

Haentzsch, Siegfried

ENVIRONMENTAL POLLUTION DUE TO ATMOSPHERIC CONTAMINANTS IN GERMANY. Preprint, Comité Européen pour le Progrès Economique, 8p., 1970. (Presented at the Deutsche-Japanische Wirtschaftsgesprache CEPES - KEIZAI DOYUKAI, Berlin, West Germany, Oct. 12, 1970.)

Major pollutants in Germany are sulfur dioxide, carbon monoxide, hydrocarbons, soot, particulates, and nitrogen oxides from incomplete combustion of fuel, automobiles, and industry. Ambient air quality standards for the Federal Republic of Germany and threshold limit values (maximum allowable concentrations) are given for SO₂, nitrogen dioxide, and hydrogen sulfide. Air quality in Germany is discussed, and ambient air concentrations of SO₂ in various German cities from 1968 to 1969 are listed. Various air pollution control laws in West Germany are reviewed. Because air pollution is a global problem, national and international cooperation has been established through several international and national commissions and organizations.

1967

38838

Durand, G.

AIR POLLUTION. LAWS - DECREES AND REGULATIONS. SUMMARY AND COMMENTARIES. (Pollution atmosphérique. Lois - Décrets et règlements. Resume et commentaires). Text in French. Commission Eau et Pollution Atmosphérique, CT/MTP Service 526 67-456, 13p, April 1967.

Clean air maintenance-related laws, decrees, and regulations enacted in France during the last years are reviewed. The Law of Aug. 1961, blaming domestic heating, industries, and automobile traffic for causing air pollution by such substances as carbon monoxide, sulfur dioxide, and fluorine, which are regarded as the most dangerous air pollutants are discussed. The Sept. 1963 Interdepartmental Decree, along with the Aug. 1964 Decree, call for the limitation of combustion-generated air pollutant emissions in special protection zones in urban areas such as Paris. Bans on the use of solid fuels with high volatile contents, and of fuel oils with high sulfur contents hope to achieve this goal in protection zones. Regular inspection of combustion equipment and the employment of qualified personnel are required.

38839

Johnston, Donald R.

DEVELOPMENT OF AIR POLLUTION CONTROL PROGRAMS BY LOCAL HEALTH DEPARTMENTS. Pop. Gov., 1967:7-10, Feb. 1967. 3 refs.

During the past two years, country health departments in North Carolina have set up air pollution control programs in Guilford, Cleveland, Durham, Gaston, Mecklenburg, New Hanover, and Rowan counties on a single-county basis and in Buncombe, Haywood, Henderson, and Transylvania counties and Beaufort, Craven, Hyde, and Pamlico counties on a multi-county basis. Community surveys were taken consisting of emission inventories, climatic data, and air quality measurements. One of the most crucial factors to the success of these projects was the training of project personnel, particularly sanitarians, in the various aspects of air pollution technology. Personnel from all of the project counties gather at an Inter-County Air Pollution Conference on a bimonthly basis. A new job classification, Air Hygienist, was set up to help with recruitment and retention of personnel. Sample Board of Health regulations were sent to local health boards, who in turn adopted regulations to control air pollution. These regulations included set up of an air pollution advisory committee, registration of sources, and prohibition of visible, open burning, and toxic emissions.

228

38840

Warren, David G.

STATE AND LOCAL REGULATION OF AIR POLLUTION. Pop. Gov., 1967:1-6, Feb. 1967. 56 refs.

State and local regulation of air pollution are reviewed. Smoke has been controlled as a common law nuisance for many years. Regulations and ordinances to control smoke have been adopted by cities, states, and the Federal government. The legislature has the power to declare places or practices to the detriment of public interests, or to the injury of health, morals, or community welfare, to be public nuisances, although not such at common law. This falls within the area known as police power. The Ringelmann Chart is commonly used to measure smoke emission. Courts have been asked to decide whether an industry of business can be prohibited from operating if it has made all reasonable efforts to comply with the required standards, but cannot because available control equipment is not efficient enough to meet the standards or is too expensive. The answer seems to depend on the severity of the pollution danger. Exemptions from the regulations are often allowed. The present status of governmental regulation of air pollution is reviewed, including state and local programs. Air pollution control in North Carolina is reviewed with respect to existing regulations and statutory and constitutional considerations in the cities, counties, county boards of health, and state.

SOCIAL ASPECTS

1973

38841

Higashida, Toshio, Tetsuo Yajima, Akira Nishimura, Mikio Isomura, and Akihiro Mitsuboshi

ON TRAFFIC AND ROADSIDE ENVIRONMENT IN RESIDENTIAL DISTRICT. (Jutakuchi ni okeru kotsu to endo kankyo ni suite). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 55-59, 1973. 1 ref. (Presented at the Japan Society of Civil Engineers, Environmental Problems Symposium, 1st, Tokyo, Japan, Dec. 3-4, 1973.)

The effect of traffic exhausts on residents of Osaka was studied. The total automobile traffic, total truck traffic, number of parked automobiles, number of automobiles leaving and arriving, driving speed, and bicycle and pedestrian traffic were recorded. Persons of primary school age or older living in the 11 residential areas studied were questioned about their family, their use of an automobile, road traffic near their house, traffic accidents involving their family, feelings about public nuisances, noise and air pollution in the area, the safety of children in the area, and other aspects of automobile effects. In Habikigaoka, the 12-hour automobile traffic rate was 4116 automobiles and 292 trucks; bicycle and pedestrian traffic were 174 and 492. About 91% of the people were worried about nuisances attributable to the automobile traffic; 18% were worried about exhaust gases.

GENERAL

1974

38842

Hampton, R. F.

DESIGN OF FLUES FOR GAS-FIRED BOILERS. Heating and Ventilating Eng., 47(558):327-332, Jan. 1974. 8 refs.

APTIC NO. 60720

APTIC NO. 60764

APTIC NO. 60630

APTIC NO. 60669

APTIC NO. 61324

APTIC NO. 59106

The design of flues for gas-fired boilers is reviewed. Atmospheric burners, draught diverters, and forced air burners and their flues are described. Common flues can be used to discharge flue gases from several boilers. To avoid condensation of flue gases, gases must be kept hot. Flue construction materials can be used with high insulation value, so that condensation will not pose a problem. A terminal can be used to ensure the satisfactory operation of flues discharging flue gases at low velocity in all wind conditions. The design principles, height, and diameters of various flues are described. Special flues include fan diluted flues and balanced flues.

1973

38843

APTIC NO. 61144

Jetter, U.

ECOLOGICAL USE OF RAW MATERIALS AND ENERGY. PRACTICABLE ENVIRONMENTAL PROTECTION FOR MEDIUM-SIZE ENTERPRISES BY INPUT OUTPUT ANALYSES OF SUBSTANCES AND ENERGIES. (Rohstoffe und Energie oekologisch nutzen. Praktikabler Umweltschutz fuer mittelstaendische Unternehmen durch Input-Output-Analysen von Stoffen und Energien). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 27(50):1, 5, 1973.

Every enterprise has an input of substances and energies of various kinds and various forms (including air and water). The input is processed and converted. The substances and energies of the input are eventually released as output. The output comprises the marketable products and waste products including emissions. Every enterprise has the task of reducing the waste products and increasing the useful products. The main purpose of this input output analysis is to determine which measures should be taken to reduce emissions and waste products.

38844

APTIC NO. 61437

Kolterer, Arnold

FACTS OF ENVIRONMENTAL CONDITIONS AND ENVIRONMENTAL POLLUTION IN AUSTRIA. (Fakten der Umweltsituation und Umweltbelastung in Oesterreich). Text in German. Umweltschutz-Staedtereinig. (Vienna), 10(10):233-236, 1973.

According to data from the Austrian Federal Ministry for Trade Commerce and Industry 115,000 tons of ash, dust and soot, 380,000 tons of sulfur dioxide, 265,000 tons of carbon monoxide, 11,000 tons of oxides of nitrogen, and 4000 tons of hydrocarbons were emitted into the atmosphere in 1969. It is estimated that traffic comprised 50%, domestic heating 10%, and industry 20%. An alarming increase of the sulfur dioxide

concentration over Vienna is reported with peak concentrations of 0.7 mg/cu m. It is expected that the annual sulfur dioxide emission will climb 25% until 1975 to 480,000 tons annually. About 30,000 hectare of forests were injured. In an additional 200,000 hectares the annual growth is declining steadily. It is estimated that the damage amounts to between 2-3 hundred thousand dollars. Regulations concerning air hygiene are far behind international developments. No air hygiene standards are in existence yet.

38845

APTIC NO. 61328

Japan Environmental Agency, Tokyo

QUALITY OF THE ENVIRONMENT IN JAPAN. 308p., 1973.

A condensed version of the Japanese White Paper on the Environment submitted to the 71st Session of the Diet in pursuance of the Basic Law for Environmental Pollution Control is presented. Part 1 describes the issues and trends of the human environment in Japan; Part 2 discusses in some detail the current situation and the corrective or preventive measures that have been taken; Part 3 outlines measures envisaged for fiscal year 1973. Seven appendices present the ambient air quality standards for sulfur oxides, carbon monoxide, suspended particulate matter, nitrogen dioxide, photochemical oxidants, and noise. Emission standards are given for sulfur oxides, soot and dust, harmful substances, nitrogen oxides, odors, and permissible limits of motor vehicle exhaust gas. The chapter on air pollution discusses the present state and countermeasures that are being taken. These include environmental quality standards, reinforced measures and regulations, countermeasures for photochemical air pollution, and monitoring and forecasting networks. Other topics discussed include: damage to health through air pollution and the implementation of research and surveys in air pollution.

1970

38846

APTIC NO. 60832

PANEL DISCUSSION. Air Pollution Control Assoc., Pittsburgh, Pa., Proc. Air Pollution Control Assoc., Mid-Atlantic States Section, Semi-Annual Technical Conf. Odors, Detect. Meas. Control, New Brunswick, N. J., 1970, p. 46-56. (May 13.)

A discussion of craft paper mill odors and their control is given. Odor thresholds, zoning of plants, tax or write-off economic advantages for control equipment, a scentometer, smoking, and standards are mentioned. Legal aspects are mentioned, including several court cases. These discussions cover topics from all the papers presented at the conference.

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